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THE LIVING BIRD

Quarterly

Winter 1989

Photo: Simon Nevill

Photo: Australia's Northern Territory Tourist Commission

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THE LIVING BIRD *Quarterly*

Cornell Laboratory of Ornithology Winter 1989 Vol. 8 No. 1

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Front Cover: The pink cockatoo nests in hollow trees along wooded streams and rivers throughout the southern Australian interior. Once a popular cage bird, the species is now protected, and populations are increasing. Photograph by John Cancalos (Valan Photos).
Back Cover: A spring 1915 class project at Bellevue Heights School in Syracuse, New York, provided plenty of fancy housing for the season's nesting birds. Our thanks to Mrs. Holly Daboll for sending the photo. Her husband, the late H. D. Daboll, displays his creation in the front row, extreme right.
Right: A kea on a New Zealand mountainside. Photo by Rick Strimbeck.

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p. 22 Kea reflects upon intruding kea

One for Dunne

Two things I want most in this life are to own a Roger Tory Peterson original and to read everything that Pete Dunne writes. Thank you for helping with my second wish; Pete's essay in each issue of *TLBQ* is pure genius.

Please inform your readers that his book, *Tales of a Low Rent Birder*, is available from the Crow's Nest Bookshop. It would be sad if they missed it.

Jonnie Sue Lyons
Signal Mountain, Tennessee

Of Spangles and Rachises

The remarks about waxwing spangles ("Focus," Summer 1988) call for a little correction and amplification. Despite their appearance, these structures do not "grow out of the feather shafts." A feather grows chiefly at the base, unlike a tree, where growth occurs mostly at the branch tips. The tip and margins of a feather are the first to arise, followed by progressively lower and more central parts. A spangle, therefore, is formed *before* the main part of the rachis.

Strictly speaking, it is true that spangles like those on waxwing tail and wing feathers occur only on waxwings. Similar structures, however, can be found on head feathers of the scaled cuckoo and curl-crested toucan, and body feathers of the open-billed stork. In all these cases, the spangles are thought to give visual signals, but this idea has yet to be tested.

Smaller, but structurally similar, bare feather tips can also be seen on feathers on the front of the head in certain rails and the pied-billed grebe. Alan Brush of the University of Connecticut has offered the plausible suggestion that these structures prevent abrasion of the feathers when the birds push their way through aquatic vegetation.

Peter Stettenheim
Lebanon, New Hampshire

Dr. Stettenheim is an expert on the feathers and skin of birds, and we appreciate his remarks.

"The Far Side," reprinted by permission Chronicle Features, San Francisco

"You imbecile! . . . We flew 12,000 miles for THIS?"

Whoops!

Does Rosemary Gaymer of Oakville, Ontario ("159 Sapsucker Woods Rd.," Summer 1988), really believe that Point Pelee is in Michigan? I thought all those friendly people in Leamington, Ontario—next to Point Pelee—were Canadians!

Sidney E. White
Columbus, Ohio

Whoops! It was the editors, not Ms. Gaymer, who moved Point Pelee into the wrong country. The famous birding hotspot, a Canadian National Park, actually juts south from Ontario into Lake Erie about 50 miles east of the Michigan border.

Gray Lump of Sanity

The Summer 1988 issue of *TLBQ* is up to its usual high quality except for one thing. According to the caption, the photo on the back cover is of a roseate tern. There is no way I can make the grayish lump of feathers resemble a tern. Please tell me that the wrong picture was printed so I can be sure of my sanity. And what bird *is* pictured?

Ellen F. Spalt
Chapel Hill, North Carolina

We got a few letters on this one. The bird, however, is a roseate tern—a chick that has not yet attained the white adult plumage.

Pavarotti Swings

Jeffery Boswall's suggestion that birds have a musical sense (Summer 1988) agrees with what I have observed.

For three summers I've been taking musical dictation from male orioles that nest in my yard. In 1986 a real virtuoso nested in my elm. That summer I notated nine distinct musical phrases in my notebook, all employing the diatonic intervals of major keys and distinct rhythmic patterns, some of which had a syncopated character.

I was amazed at his patient repetition of the more difficult phrases, practicing a muffed passage until he achieved a polished performance.

Alma Watson Ishii
Menominee, Michigan

Jeffery Boswall's article reminds me of an event that occurs almost daily in my front yard. I ask, do birds have a sense of fun? I'm convinced that they do.

Every morning at nine o'clock six barn swallows swoop into view. One bird picks up a white feather from one of our Embden geese and soars swiftly, dropping the feather from a great height. A dizzying dogfight ensues and another swallow grabs the feather before it lands. Then *he* takes it aloft and the game starts again. This goes on for 20 minutes or so.

Also, our male goose, while waiting for his mate to hatch last spring's clutch, spent his lonely hours pecking at our tire swing. He would actually push hard and wait for it to swing back so that he could poke it again. He played this game so often that we changed his name from Gordo to Ezekiel (and the wheel).

What with feather tag and wheel swinging I'm not sure that the term bird brain applies here.

Mrs. Douglas Crocker
Alexandria, Ohio

U.S. Fish and Wildlife Service has accepted a National Audubon Society petition to list the marbled murrelet, a robin-sized seabird, as "threatened" along the Washington, Oregon, and California coasts, where the population is estimated at a few thousand birds. The petition was filed in January and accepted in October 1988. USFWS is conducting a status review, evaluating data to determine if the bird will actually be listed.

The murrelet's only known nesting sites in the Pacific Northwest are in forests of Douglas-fir and other conifers more than 150 years old. Most of these stands are targeted for harvest.

Loss of nesting sites is not the only threat to the small seabird. The murrelet dives after fish and crustaceans; many of the birds are caught and drowned in commercial fishing nets. Also, the murrelet lays only a single egg each year. With such a low reproductive rate, populations may be unable to withstand high mortality and loss of nest sites.

The move to protect the murrelet is part of a larger issue, that of protecting old-growth forests which are themselves threatened. Most of the trees in which the murrelet nests are in national forests, which are managed for multiple use: recreation, wildlife conservation, watershed protection, and sustained-yield forestry. Forestry concerns are typically placed foremost, however. Unless the wildlife species that rely on coastal stands of old-growth trees are legally protected ("Update: Spotted Owl," Autumn 1988), their habitat will probably continue to be cut for timber.

Tropical rainforests are the focus of a directive from the U.S. Treasury. In April 1988, Treasury secretary James Baker provided U.S. representatives of multilateral development banks (MDBs) with guidelines for evaluating dams, timber harvests, and agricultural developments that could adversely affect tropical forests.

The directive calls for the U.S. government to reject proposed projects if they threaten protected areas, watersheds, or rare and endangered species, and if they fail to protect indigenous peoples.

Baker's action was in part precipitated by the urging of national environmental organizations that have often criticized MDBs—the World Bank in particular—for contributing to rainforest destruction in the developing world.

The World Bank is also restructuring itself to increase its responsiveness to environmental issues. In May 1988, World Bank president Barber Conable announced that four regional offices would be established "as environmental watchdogs over bank-supported projects and as advocates for promising advances in resource management." Responding to criticism that some bank loans had resulted in rainforest destruction, Conable said, "If the World Bank has been part of the problem, then I intend to make it a leader in finding solutions."

The pet trade in exotic wild birds is the subject of a new display booth and slide show available from the Humane Society of the United States.

The international pet trade is a significant threat to many wild bird populations; millions of birds die every year as a result of inhumane capture and transport methods. For every bird sold in a pet store in the U.S., experts estimate that 1 to 100 additional birds have died along the way ("Parrots for Sale," Summer 1985).

FROM THE DIRECTOR

Summer courses in ornithology are a long-standing tradition here at the Lab. During the seven years that I've been here we've always taught them, either through Cornell's Adult University, or at the University's Arnot Forest, or at various other locales such as the Sierra Nevada Field Station in northern California. The topics have varied, too, from bird biology and identification to bird photography and natural sound recording.

The Lab staff enjoys teaching. It's fun to meet our members and to share birding experiences. Teaching also benefits Lab programs directly. For example, our course in recording natural sounds has taught folks to make better recordings so that they can make valuable contributions to our Library of Natural Sounds. And students in a course that we taught for the first time last year—Bird Population Studies—should be able to help us collect high-quality data for use in our bird population analyses (see Mike Harwood's column on that subject).

This year we are pleased to offer our successful course in natural sound recording, which will be held at the Sierra Nevada Field Station and in Machias, Maine. More details and an enrollment application are on the inside front wrapper of this magazine.

We will not, however, be teaching a course in bird population study this summer. We are in the process of modifying the course to make it more valuable to our members, staff, and Bird Population Studies program. We hope to offer it again in the summer of 1990.

Besides the natural sound recording courses, we invite you to participate in one of our birding tours. This year we have arranged several to many parts of the world, and you should have received a brochure describing these trips last October. If you didn't, let me know, and I'll see that you get one right away. We hope that you'll join us for a course or on a tour—it would be fun to meet you!

CHARLES WALCOTT, Executive Director

For more information about the display and slide show, or to receive a free brochure about the wild bird trade, write:
Humane Society of the United States, 2100 L Street NW, Washington, D.C. 20037.

pro Esteros is a new bi-national conservation organization committed to protecting the estuaries of Baja California, Mexico. Although most Baja marshes are still pristine, some—in particular those at Ensenada and San Quintin—are threatened by plans for development. These marshes are vital habitat for a number of birds classified as endangered in the United States, including the light-footed clapper rail and the California least tern.

Co-chaired by a Mexican and a U.S. citizen, *pro Esteros* will be incorporated as a non-profit organization in Mexico with a U.S. chapter.

For more information, write to Barbara Massey, 1825 Knoxville Avenue, Long Beach, California 90815.

Giving Back to the Birds

A bright early morning on the far down-eastern Maine coast defines for me the fully realized concept of heaven, so my day was off to a great start even before Barna Norton cranked the diesel of his boat, the *Chief*, and pointed the bow toward the Gulf of Maine and the island with the French name that Mainers pronounce 'tit M'nan.

I was one of the students in a week-long course, Bird Population Studies, taught late last June at Machias, Maine, by Greg Butcher and Todd Engstrom of the Cornell Lab under the aegis of the Institute for Field Ornithology at the Machias Campus of the University of Maine. The class was headed for 'tit M'nan—Petit Manan is the name on the map—to help census the tern population there. We had been scheduled to go out to the island four days earlier, but weather had kept us ashore. Meanwhile, Greg and Todd had introduced our group to a variety of techniques with which avocational birders may collect useful data about bird populations.

In order to conserve and protect birds, we need knowledge about population sizes, breeding densities, breeding and wintering ranges, behavior, and much else. There are nowhere nearly enough professional field biologists to collect this information, so amateurs might contribute a great deal more than they do now to knowledge of American birds. North America may have more birders per square mile than any other region in the world outside of Great Britain, and our birder population has been growing steadily all this century. At the same time many North American bird populations have apparently been in steady declines.

Unfortunately, we can't demonstrate those declines as well as we should be able to, because relatively few birders have been much help keeping track. We have long had a huge pool of capable amateur observers, but they have been difficult to harness. A major goal of the Cornell Lab is to draw many more amateurs into bird population studies—by proselytizing and by educating.

So Greg and Todd's course had exposed us to techniques used in collecting data for breeding bird atlases and for the Cornell Lab's Nest Record Program. We had tested our abilities to make quick, accurate count estimates of bird flocks and had explored ways of improving our accuracy.

We had field-tested the methods used in the annual Breeding Bird Survey managed by the U.S. Fish and Wildlife Service. The service introduced this project more than 20 years ago, and nowadays nearly 2,000 survey counts are made every breeding season in North America. To conduct a count, a volunteer observer, alone or with a driver/timer/note-taker, covers a specific 25-mile route, stopping at half-mile intervals to look and listen, make counts of species and individuals for exactly three minutes at each stop, and note the numbers on a standard form.

The data from the hundreds of routes are later logged into a computer, making them accessible for long-term studies of population trends. For example, the USFWS has been able to use the data to document uniform declines in the numbers of black terns, northern bobwhites, eastern and western meadowlarks, northern flickers, and field sparrows.

We had also studied the methodology of the Breeding Bird Census, started by the National Audubon Society in 1937 and now managed by the Laboratory, in which the observer records the species and numbers of birds nesting on large plots of carefully measured habitat. Such censuses require a lot of work, and most plots have been censused in only one breeding season. But a few have been done year after year, and others have been repeated after intervals of several years. These censuses now provide extremely useful information about trends in species' populations.

And now, on this fine June day, we were scheduled to experience another kind of censusing—counting birds in a nesting colony, which is what put me in Barna Norton's *Chief* on the way to 'tit M'nan.

MICHAEL HARWOOD

Instructor Engstrom, left, points out quick and accurate techniques for counting birds to course participant Paul Schaefer.

Petit Manan is one of the small outer islands of the Maine archipelago, and it used to be the site of a "kept light"—a lighthouse station manned by the Coast Guard. The tall lighthouse still stands on the island's highest rise, but it operates on automatic pilot now, and the island has become part of the Petit Manan National Wildlife Refuge. Instead of lighthouse keepers, the people in charge are naturalists and USFWS personnel.

Fifteen hundred pairs of terns nested there last June—common, Arctic, and roseate—as well as laughing gulls, black guillemots, and at least one pair of Atlantic puffins. Refuge manager Tom Goettel told us that the reason the island was so attractive to many nesting seabirds was the constant presence of a few humans. That may sound strange, but such a presence seems to keep herring gulls and great black-backed gulls from moving in. As soon as large numbers of these big gulls are nesting on an island and eating the eggs and young of other species, most of the other birds clear out.

That's a matter of considerable importance now. Our garbage supports ever-larger populations of herring gulls and great black-backs, and our greed for coastal hideaways and picnic spots leaves fewer and fewer undisturbed islands and beaches for colonial seabirds to build their nests. It was appropriately symbolic that though no herring gulls and great black-backed gulls were nesting on Petit Manan, they did nest on Green's Island, a few hundred yards distant. They seemed to loom there, waiting for humans to give up and leave Petit Manan.

The four-day delay in our arrival on the island unfortunately meant that we happened to arrive on a day of peak egg-hatching for the terns, and their caretakers wisely elected not to turn a bunch of tyros loose on unfamiliar terrain among the hard-to-see ground nests and chicks. There was some censusing that could be safely done, however, and that Tom Goettel wanted us to do. We could count the gull and eider nests on Green's Island. Eiders and gulls coexist there presumably because the eiders are large, they nest in deep, thick vegetation, and once the hens have eggs they hardly ever leave their nests uncovered.

Green's is connected to Petit Manan by a bouldery, seaweed-covered bar, exposed at low tide, and with Tom in the lead, about 10 of us hop-scotched, stumbled, skated, and waded across to do a count. We formed lines and advanced through the grassy upland and along the beaches of the low, crescent-shaped island, shouting out to assigned note-takers the information Tom wanted: "Gull nest with eggs!" "Eider flush!" "Gull nest—empty!" "Gull nest with eggs!" "Eider nest!" We moved quickly so as not to keep any eiders off their nests long enough to put the eggs in jeopardy.

Meanwhile, offshore, hundreds of eiders—mostly the white and black drakes—steamed along the water in flocks, and two species of seals, gray and harbor, sunned on a granite ledge.

I'd never been so close to eiders; the big hens were flushing almost from under our feet in the knee-high grass. This was also my first sight of eider nests—amazing and beautiful—lined with down and looking like large, fluffy bowls made of brown belly feathers. In a narrow strip perhaps a half-mile long, we found 185 of them. From the beach below one would never have guessed at such a high number.

There were only about a third as many gull nests as eider nests, which suggested to me that the protective aura of human presence on Petit Manan might be felt several hundred yards away. Unlike the terns next door, the gulls did not dive at us or set up a screaming commotion but floated cautiously overhead on set wings. Meanwhile, offshore, hundreds of eiders—mostly the white and black drakes—steamed along the water in flocks, and two species of seals, gray and harbor, sunned on a granite ledge.

I was not only in heaven; I was also in my element. This is the kind of birding that lights up my spirit. We were adding to the data about bird populations, thus aiding conservation, and because we were focused on that task we were seeing birds and their environment in ways we never would have done otherwise. I think of such activity as "giving back to the birds," but in fact the birds always give me far more than I can return.

In the last 50 years amateur ornithology in North America has been focused on competition—My List Is Bigger Than Your List—much more than on conservation. We are also a highly mobile people on a very large land mass, hard to tie down to single locales or a few deeply rooted interests. And for us, it seems, and maybe for most amateurs everywhere, birding is mainly a pastime—"that which amuses, and serves to make time pass agreeably." A friend who does a great deal of birding, for example, insists to me that although Christmas Count data have proven useful in assessments of winter bird populations, the scientific value isn't important and shouldn't be a controlling factor in how we go about making the counts. What's important, he says, is the *fun*. I think he represents the majority opinion.

This may suggest at first glance only that we're on the whole too self-centered to "give back to birds" for the pleasure they give us. But in fact it also proves a crucial point about amateurs collecting data. Get us out in the field at seasons when we wouldn't otherwise do much birding—such as the middle of winter—or put us in unfamiliar situations—such as on a small island off the Maine coast—all for the sake of collecting data, and our personal knowledge about birds can grow enormously—and with it, our enjoyment.

In my mind's eye I see myself during the Connecticut Breeding Bird Atlas project a few years ago, discovering with astonishment a ruffed grouse nest, full of eggs. It reminded me of Louis Halle's remark on finding a veery's nest with young in a city park in Washington, D.C.: "The sensation that filled me at that moment could not have been more overpowering if I had stepped through the shrubbery to find the end of the rainbow." I remember my delight, as I counted migrating broad-winged hawks one fall day, when I noticed that entire flocks were catching and eating dragonflies in flight.

And here am I, after the circuit of Green's Island, tottering over the cobbles toward the cove in which Barna Norton and the *Chief* wait to take us to the mainland. I am bushed, and my knees quiver from the exertion, but I am thinking about big gulls and big brown ducks and big saucers of down in deep grass, and I am exalted by the stretching of my awareness of birds. —**Michael Harwood**

Oölogy: From Hobby to Science

Lloyd Kiff

Few bird watchers today are aware of the tremendous passion for collecting bird eggs which formerly existed in America. At the turn of the century, most bird enthusiasts collected eggs or had done so during their youth. Indeed, egg collecting was regarded as a natural part of growing up, and the collections were regarded with a reverence both intellectual and aesthetic. Oölogy—the study of eggs—was accepted by persons of learning as a respectable pursuit, and it was touted by its adherents as a legitimate biological discipline.

Just like modern birding, oölogy drew people—mostly men—from every walk of life. Renowned egg collector Fred "Kelly" Truesdale, an itinerant farmhand and cowboy in central California, was welcomed with fanfare into England's prestigious Oölogists' Exchange Club in 1932. One of his frequent field companions was Milton Ray, a wealthy San Francisco industrialist who at one time was the poet laureate of California.

Most of the 19th-century giants of American ornithology, including Robert Ridgway, Elliot Coues, and Charles Bendire, routinely collected eggs as a part of their field work. Some bygone private collectors were leading conservation figures, including longtime National Audubon Society president T. Gilbert Pearson; Audubon biologist and lecturer Alexander Sprunt, Jr.; and William T. Finley, one of the West's best-known conservationists and wildlife photographers.

I was fortunate enough to become acquainted with several of the last of the American oölogists in the 1970s, when most of them were octogenarians or older. Having grown up as an avid life lister and bird bander, I was fascinated to discover the same personality types and drives among the oldtime collectors. It seems certain that many of today's prominent birders would have been equally avid egg collectors in a Victorian context. Like hard-core birders, certain egg collectors traveled hundreds of miles over treacherous roads to acquire the eggs of a single species missing from their collection.

The passion for egg collecting which existed at the turn of the century has left a valuable legacy of specimens and data for researchers today. Left, brothers Fred and Ed Court admire bald eagle eggs taken from a leafy aerie near Washington, D.C., in 1898 with the aid of tree climber's spikes, foreground.

Why did people collect eggs? I once speculated that no one would have collected eggs if all eggs were white because the impulse was stimulated by the incredible variety of colors and patterns on eggshells; however, Michael Walters, an ornithologist at the British Museum of Natural History, subsequently showed me a collection made by an English gentleman which contained only white eggs!

Egg collecting reached its zenith in North America at the turn of the century, but a decline in its popularity soon became apparent. The excesses of some collectors, especially those of commercial dealers in natural history specimens, were viewed with increasing hostility by a new generation of American naturalists armed with binoculars and a conservation conscience. Furthermore, except for Arthur Cleveland Bent's respected *Life Histories of North American Birds*, the oölogical literature rarely rose above the level of anecdotal accounts of collecting trips, and the purported scientific benefits from egg collecting gradually became regarded as little more than justification for a hobby. Such changing attitudes were reflected by the passage of federal and state laws restricting egg collecting by private individuals, and by 1940 the practice had been virtually eliminated in North America.

As a result of the unfavorable image oölogists had acquired, academic interest in egg collections bottomed out between World War II and the early 1960s, and important egg collections languished in museum attics and private closets. The proud heirs of one prominent eastern collector, whose egg display had won a gold medal at a turn-of-the-century world's fair, were dismayed to find that no museum would purchase their father's precious egg collection when they tried to dispose of it in the early 1950s. They could not even find a suitable institution that would accept the collection without a trust fund to ensure its proper care and housing.

The indifferent attitude of the academic community toward egg collections prompted several Califor-

BHL

Blank Page Digitally Inserted

Private collector George W. Morse (1862–1948).

I Want An Egg Collection!

I have had hundreds of them during the past fifteen years ranging in value from a "few cents" to thousands of dollars but, I never picked or set aside—in all these years or from all of these collections—a single specimen for a personal collection, although I've freqnently thought of starting one. I have the fever real bad but find that in order to allay the same that I must begin way back with the "small boy" in the earliest stages of forming an oological collection and that as a starter I shall require sets of such rare species as the Robin, Catbird, Brown Thrasher, House Finch and even the English Sparrow.

Hence I have decided that during the first thirty days of my collection's career, that I will accept strictly A No. 1 full and complete sets *of any species* recognized as belonging to the North American Fauna.

The authenticity of these sets must be unquestionable and the data accompanying the same must be very complete.

I prefer (am not positive on these points however) to receive sets of '94 collecting and direct from the original collector.

Now if you have one or more sets which you think would please me and which you will exchange at *full* Standard Catalogue rates for anything I offer below at prices quoted I want them and wish that you would send on at once *prepaid.*

Remember I will only accept such sets as I have designated and on conditions named and although I will accept any number of sets from a single collector—I will not accept more than a single set of a species from the same party—I also reserve the privilege to return any set not up to my standard and also the duplicate sets of many species which I shall undoubtedly receive, should I so desire. Your specimens are to be sent at your risk and *prepaid.* I will send all return packages prepaid and at my risk.

This offer is a very broad one and will never be repeated—it will hold in force until Dec. 15th not a single day later.

I have no time to correspond over this matter, hence do not write me in relation to the same unless your letter is accompanied with specimens.

Faithfully,
FRANK H. LATTIN.

The following are the articles and the prices at which I offer them in exchange for the above:

"Bird Life in Labrador," Stearns	$ 1 00
"Birds of Michigan," Cook	1 00
"Standard Catalogue of N. A. Birds"	35
"Methods in the Art of Taxidermy" Davie	20 00
Hermit Crab in Shell	50
OOLOGIST, 1892, bound	1 00
An assortment of showy shells for ornamental purposes, worth any amount from $1 to $50—as you may elect, my selection; and should you select this lot it must go by Express or Freight at *your* expense.	
Rare Starfish (*Echinaster sentus*)	50
Mammoth Purple Pacific Sea Urchin	1 00
Sea Horse	50
Egg of Hammerhead Shark	25
Acorn Barnacle, double	15
Scaphites nodosus, Fossil, very fine specimens at 15, 25, 50c and $1	
Scorpion, nicely mounted in box	75
Porcupine Fish, nice small specimen	1 00
Chameleon, Alcoholic specimen in bottle	50
Sea Fern, choice	50
Sea Fan	25
Curio Sponge	25, 50 and 1 00
Cat's Eye Scarf or Stick Pin, either dark or light variety	50
Spar Scarf or Stick Pin	25
5 Spar Scarf or Stick Pins, all different	1 00
Spar Charm containing views of World's Fair	50
Geodes, selected complete specimens, about 3 in. in diam	1 00

Novelties—My selection from stock left on hand, such as I offered as premiums with the OOLOGIST, any amount from 50c to $10.

Fishing Tackle from stock on hand, my selection, any amount from 50c to $5.

Opals, beautiful polished Mexican specimens, $1 to $5.

Azurite and Malachite, showy specimens, 25c to $2.

Agates, beautiful, selected polished ones from Brazil, 35c to $5.

Agate Watch charm, same as last, 50c.

Trilobites, *Calymene senaria*, seconds, 50c.

Scientific Shells, carefully labelled collections of any value you may wish, from $1 to $200 or over.

Text from *The Oölogist*, Vol. 11, 1894.

nia naturalists to form a new organization to serve as a depository for unwanted collections, including their own, as well as to continue to field collecting expeditions in unexplored parts of the world. Under the guidance of Los Angeles businessman Ed Harrison, the group originally intended to gather more than bird eggs, so they chose the name Western Foundation of Vertebrate Zoology to allow such latitude. As the organization took shape, however, birds and their eggs and nests became its focus. Now the foundation holds nearly 300 egg collections from around the world and is the undisputed world center of oölogical research.

It was an ecological tragedy that first suggested the importance of egg collections to ornithologists. In 1967, just a decade after the foundation began collecting collections, the British researcher Derek Ratcliffe documented severe eggshell thinning in English peregrine falcons and suggested that the thinning was caused by pesticides in the birds' environment. Soon after, Joseph Hickey and Daniel Anderson of the University of Wisconsin documented a similar phenomenon in several North American species and showed that it resulted from contamination of the birds by high levels of DDE, a metabolite of the ubiquitous pesticide, DDT. Ornithologists were quick to perceive the value of long-ignored egg collections as a source of baseline data on eggshell thicknesses that existed before synthetic pesticides came into use in the late 1940s. Egg collections have now been used in hundreds of studies on DDE-induced eggshell thinning throughout the world.

Using eggshells to document environmental change caused by contaminants was only the beginning. Eggs in the foundation's collection are a rich source of information on many topics. Since its formation, foundation collections have been used in more than 3,000 research projects, and the rate of usage continues to grow each year. The collection has been examined by anthropologists to identify eggshells from Indian middens, by historians to establish the travel itineraries of extinct collectors, by physiologists to study the relationship of egg size to the length of incubation periods, by ecologists interested in the evolutionary significance of egg size and color, and by government agency biologists interested in historical and life history information on now-endangered species.

As important as the eggs themselves are the data that accompany them. Although most egg collectors were not professional ornithologists, virtually all had a first-rate knowledge of the birds of their region, and most of them carefully recorded scientific data as they collected their specimens. These data, preserved on slips that accompany the eggs, contain details on species, date and locality of collection, height and location of nest, and stage of incubation. In aggregate, the slips represent one of the most important bodies of historical data on North American birds, and they are consulted frequently by ornithologists to reconstruct former distributions, to determine the extent and timing of breeding seasons, or to provide information on nesting habits.

ED HARRISON

Left, itinerant cowboy and renowned oölogist Fred "Kelly" Truesdale was welcomed with fanfare into England's prestigious Oölogists' Exchange Club in 1932. Below, just one of the occupational hazards: egg collector Roy C. Hallman of Homestead, Florida, sizes up a diamondback rattlesnake.

In the past five years, the foundation staff has supplied information from data slips to the compilers of at least 25 state breeding bird atlases. It is to their credit that the collectors kept careful and reliable records: the usefulness of these data to modern research efforts supports the oölogists' original claim that they were truly part of the scientific community.

Nevertheless, in the past some ornithologists have been loathe to use egg collections for research, feeling that there was too great a tendency for some collectors to falsify data for commercial or other reasons. It is true that the commercial aspects of egg collecting did lead to some ethical lapses. I have seen a set of roadrunner eggs painted with bold splotches of dark brown shoe polish and passed off as the eggs of the scarce snail kite. European sparrow hawk eggs purchased cheaply and abundantly from English dealers were sometimes sold to unsophisticated American collectors as sharp-shinned hawk eggs, just as European crane eggs were fraudulently substituted for those of the sandhill crane. More than one purported egg of the California condor, the most desirable egg of all, turned out to be that of a mute swan collected from a city park. Critical examinations of egg collections, however, have indicated that only a minority of American collectors made such mistakes, either intentionally or accidentally, and most egg set data are reliable.

Lt. L. R. Wolfe (right) collecting prairie falcon eggs, 1927.

A Substitute for Climbers.

A fairly good substitute for the regular climbers is to get two pieces of strong iron in the shape of isoseles triangles. Have three holes made at the base and through these screw them to the heels of an old pair of shoes. These are quite serviceable for a man of light weight.
O. C. Pratt.

A Novel Egg Blower.

I always take great pleasure in learning some new contrivance in the oological line to lessen the labor of the enthusiastic collector and having quite a wind saving contrivance I will let my brother collectors know of it. This wind saver is Gas. There is gas in our house and when I want to blow an egg I hitch a small hose onto the jet and the other end I have attached to the blowpipe. Drill the hole in the egg, then put the blowpipe in position, turn on a little gas and out comes the contents of Mr. Egg.
Jay G. Smith.

Queer Place for Horned Lark's Nest,

On the 10th of May, '93, while collecting in the foot-hills east of Fountain, Colo., I was attracted by the curious flutterings of a female, Prairie Horned Lark. I watched her unperceived for a few moments, when she suddenly disappeared. Upon search, I found an abandoned Prairie dog's burrow, and failing to find another opening, I decided the bird had gone into the hole. So with a camp axe I chopped and dug into the ground around the hole, when at the depth of 4½ feet I found a nest composed of dried buffalo grass and feathers, containing five eggs of the Prairie Horned Lark—*Otocoris alpestris praticola*--in an advanced state of incubation.

Will D. Waltman,
Colo. Springs, Colo.

Carl H. Richter with yellow rail nest, 1929.

A Couple of Dogs.

In response to your call for contrivances of aid to oölogists I wish to say I find a couple of dogs, one English setter and one pointer that I have, of excellent service in locating nests of the ground builders; having found with their aid in the last few years a great many valuable sets, such as Short-eared Owl, Marsh Hawk, Prairie Chicken, Quail, Woodcock, Meadowlark and others to numerous to mention.
J. H. Brown.

A Series of Nests.

When Howard Pitkin, of East Hartford, was harvesting his tobacco last September, he discovered upon a girder in one of his sheds a queer specimen of bird architecture, which seems to be without parallel in ornithology. This was a nest—or rather a series of nests—of the common robin. There were eleven in number, built close together in one row and so interwoven that the whole string could be lifted like a chain. Evidently they were the work of one bird, or one pair of birds, and seemingly were built from center, as the center nest contained the eggs, and the nests at each end were in an unfinished state. The others seem to be perfect in construction, but differ very much from the nests usually built by this bird—the coarse sticks of the foundation and the mud plastering of the inside being absent. Another peculiarity is that they built of one kind of grass, after the manner of the nests of the orchard oriole; and this grass is so intertwined and woven together that it links the whole series into one piece. The eggs are indisputably robin's, and, indeed, the bird was seen and recognized. At the time the nests were found the eggs were fresh. This was two months later than the time of robin nesting, even of the second laying. The only plausible theory of the motive for constructing such a domicile is that these nests were constructed by a male bird who had jnst arrived from Salt Lake City.—From an old Hartford Times.

A. F. Ganier collecting warbler eggs, 1953. Photo by Earl Arnold.

A Collecting Ladle.

On the 11th of Junn, '92, I had the good fortune to find a Yellow-billed Cuckoo's nest, but the nest was situated on a branch limb of a willow tree, which limb of course would split off very easily, so I contrived an apparatus, which consisted of a baking powder box cover tacked on to the end of an 8 ft. stick, thus making a crude ladle, then climbed the tree, reached out with my primitive ladle, and in a few seconds had a set of five slightly incubated eggs. This idea may be useful to collectors.

E. H. Fletcher,
Brockton, Mass.

A Nest Within a Nest.

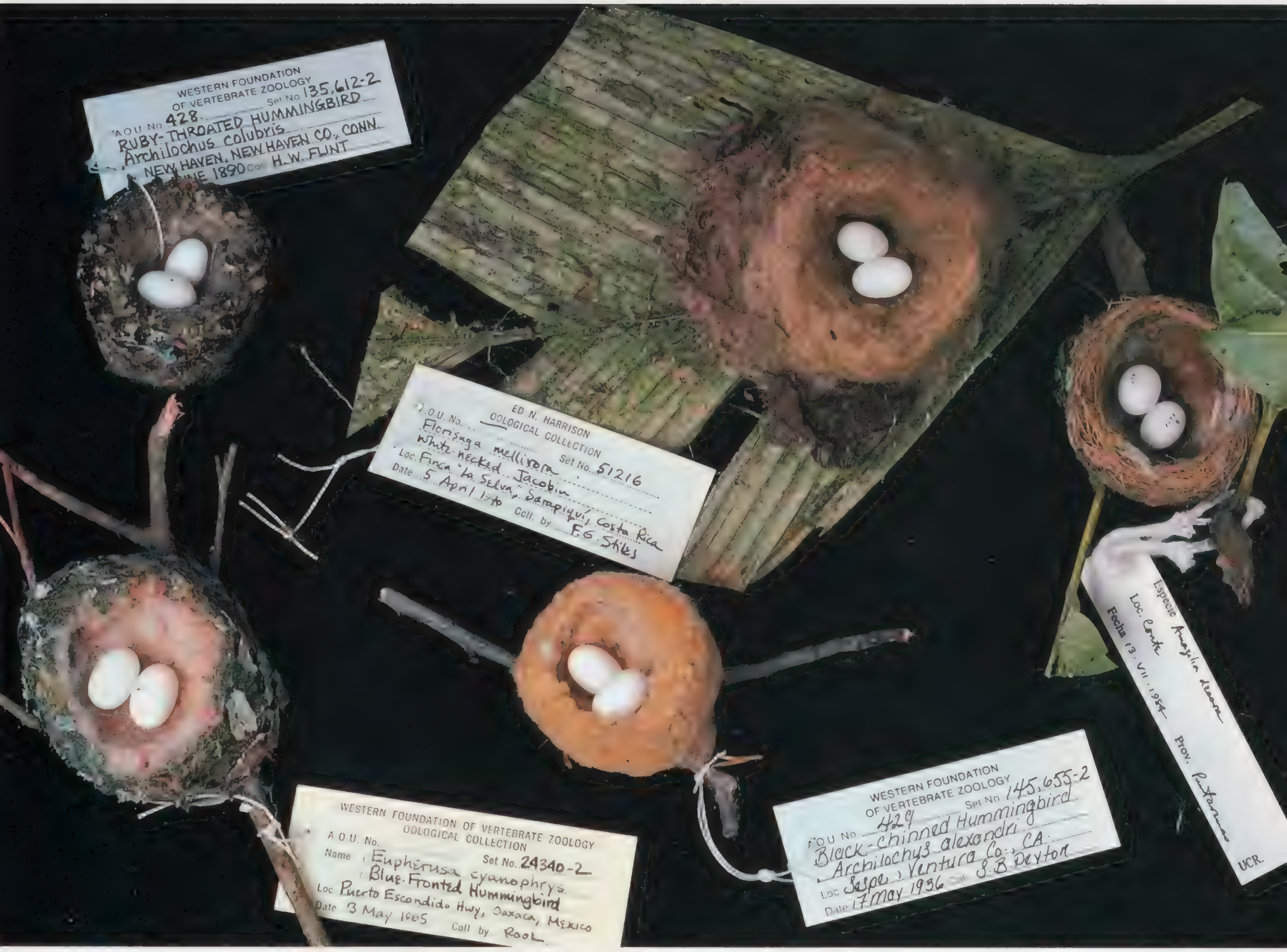
It was my good fortune to run foul of a most peculiar nest of the House Wren last summer. Thinking it might interest you I send you the facts.

The nest was made in a Baltimore Oriole's nest. From about two inches from the bottom of the nest the Wrens had filled up the cavity with the material used by them, leaving a hole through the center to get out of. The two inches they did not fill up they lined very heavily with feathers, so thickly that I could feel but one of the five eggs the nest contained. I know the Wren builds most any place, but I think this is by far the most peculiar that I have ever heard of.

J. B. Canfield,
Bridgeport, Ct.

From The Oölogist, *Vol. 14, 1897.*

***Left,** Arthur Cleveland Bent (in boots), egg collector and author of the famous* Bent's Life Histories, *and Wright M. Pierce, well-known California collector, at golden eagle nest in San Bernardino County, California, 1929. This nest is still in use.*


WESTERN FOUNDATION OF VERTEBRATE ZOOLOGY
A.O.U. No. 428 Set No. 135,612-2
RUBY-THROATED HUMMINGBIRD
Archilochus colubris
NEW HAVEN, NEW HAVEN CO., CONN.
JUNE 1890 Col. H.W. FLINT
ED N. HARRISON OOLOGICAL COLLECTION
A.O.U. No. Set No. 51216
Florisuga mellivora
White-necked Jacobin
Loc. Finca "La Selva", Sarapiqui, Costa Rica
Date 5 April 1970 Coll. by F.G. Stiles
WESTERN FOUNDATION OF VERTEBRATE ZOOLOGY OOLOGICAL COLLECTION
A.O.U. No.
Name Eupherusa cyanophrys Set No. 24340-2
Blue-Fronted Hummingbird
Loc. Puerto Escondido Hwy, Oaxaca, Mexico
Date 3 May 1905 Coll by Rook
WESTERN FOUNDATION OF VERTEBRATE ZOOLOGY
A.O.U. No. 429 Set No. 145,655-2
Black-chinned Hummingbird
Archilochus alexandri
Loc. Sespe, Ventura Co., CA.
Date 17 May 1956 Col. S.B. Peyton
Especie Amazilia
Loc. Cont
Fecha 13. VII. 1954 Prov. Puntarenas
UCR.

FRANS LANTING

Of greater concern to today's biologist are the biases of legitimate egg collectors, many of whom succumbed to the predictable tendency to place a premium on the unusual—larger clutches, prettier clutches, and eggs of anomalous sizes and shapes. These choices contribute to a collection that may be aesthetically pleasing but is not representative of the average in nature.

As one approach to gauging the importance of egg collector biases, Todd Engstrom of the Cornell Laboratory of Ornithology and I are presently comparing Cornell Nest Record data with museum egg collection data. It will be interesting to see if similar figures for clutch sizes and breeding dates for well-represented species are obtained from these two different types of databases.

The foundation is not the only depository of useful egg collections in North America. Now that the research value of collections has been established, their status has risen considerably. About 100 scientifically important collections, containing in total about 500,000 clutches of eggs, are now housed in other North American institutions. Recently, the foundation compiled a computerized inventory of these collections for the American Ornithologists' Union, and we were surprised to learn that only about half of the world's bird species are represented; however, the inventory indicates that at least one clutch of eggs exists for every species that breeds on the North American continent.

The fact that oölogists traditionally collected entire clutches or "sets" rather than removing a single egg from the nest is fortunate for modern researchers. This practice has the advantage of permitting the study of variations in size and color of eggs in the same clutch. It may also have been a better conservation strategy than taking one or two eggs, since the females of most species tend to replace lost whole clutches but not lost individual eggs.

Egg collections are not assemblages of whole eggs but of empty eggshells. The original contents were drained through a single hole drilled in the side of the egg. A stream of air or water was introduced through the hole, and the resulting internal pressure forced the contents of the egg out through the same hole. Because small blowholes were a matter of pride among collectors, recently laid eggs containing only liquid yolk and white were preferred; with patience, however, some collectors managed to coax the contents of even well-incubated eggs through remarkably small holes. The drained shells, which consist mainly of calcium carbonate crystals, seem to last forever if not broken or subjected to excessive light or moisture. Intact eggs of the extinct giant elephant bird still turn up occasionally in Madagascar, and one fresh-looking specimen was 14,000 years old. Most large museum collections contain eggs more than 100 years old which, if they have been protected from exposure to light, cannot be distinguished from recent specimens.

The data slips that accompany each set of eggs in the Western Foundation of Vertebrate Zoology's collections (top left) are an important source of historical information on bird distributions and nesting habits. Below left, healthy peregrine falcon eggs from the 1940s and unhealthy (thinned) ones from the 1960s. Researchers compared these eggs to show the effects of DDE in the birds' environment on eggshell thickness. Left, director Lloyd Kiff shows off part of the Western Foundation's huge egg collection.

In the United States today, only professional biologists studying environmental contaminants or engaged in other specific research projects may legally collect eggs. No ornithologist would advocate a return to the days of private wildlife collecting, and many present bird populations, already depleted by a myriad of causes, could not survive the attentions of a nation of egg collectors. The hobby of egg collecting is an extinct piece of Americana, reflecting a past generation's different approach to the study and enjoyment of nature.

Nevertheless, thanks in large part to the diligence of the oldtime collectors, the serious study of the avian egg is alive and well. The collections are wonderful libraries of information, a public trust. Each specimen is unique and, if properly protected, can be used over and over for future studies, including some not anticipated by past—or present—generations. ☐

Lloyd Kiff is director of the Western Foundation of Vertebrate Zoology and Curator of Ornithology at the Los Angeles County Museum of Natural History.

Further Reading

Kastner, Joseph. *A World of Watchers.* New York: Alfred A. Knopf, 1986. Chapter 10.

Special thanks to Raymond Quigley, associate curator of the Western Foundation of Vertebrate Zoology, who provided the old-time collector photos from his personal collection of historical ornithological photographs.

Look Closely, It Is All on the Canvas

Donna Sanders

Asking artists to select a favorite among their own paintings is like asking parents to pick a favorite child. Even if they have one, they may not want to reveal it. Besides, artists are seldom totally satisfied with their work. Repeatedly they declare that their next painting will be their best.

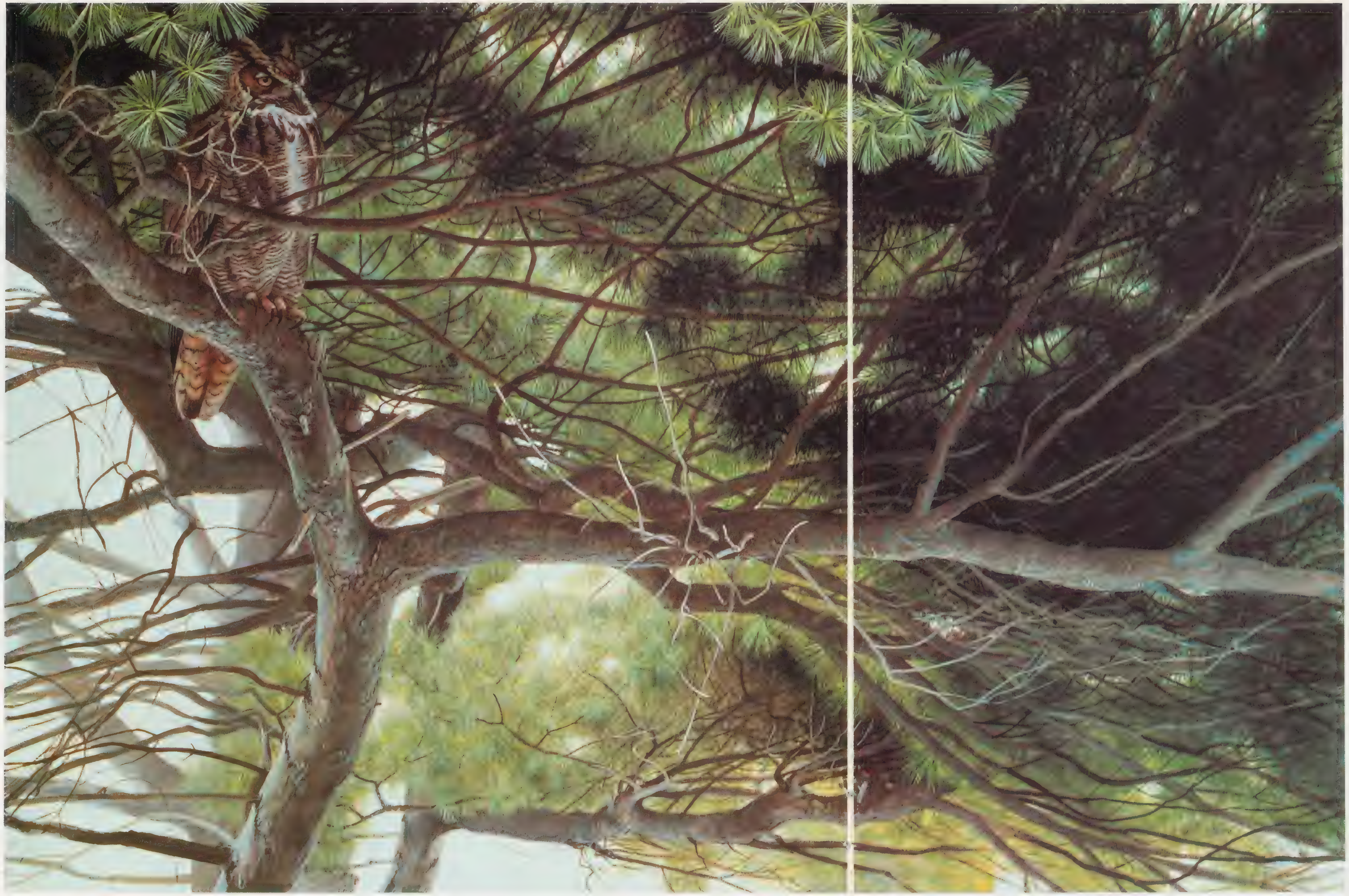
At 93 Owen Gromme has been painting longer than most people live, and he continues to see painting as the ultimate challenge. "I still have my best picture to paint," he told me. "I've never been completely satisfied. It will be downhill if I ever am."

Yet when I asked Gromme and four other well-known wildlife artists—Arthur Singer, Robert Bateman, Guy Coheleach, and Maynard Reece—to pick a favorite bird painting for reprinting in *The Quarterly*, each obliged, although Bateman refused to label his as "favorite." "They are all my favorites," he said. "However, I can say that my tastes lean toward the abstract rather than the obvious."

Here, then, is a very special showing. Each of the artists featured on these pages has had his work showcased in the prestigious Birds in Art exhibit at the Leigh Yawkey Woodson Art Museum, Wausau, Wisconsin, as well as in various publications. Each has used his artistic ability to champion the cause of conservation. And each has personally selected one painting for this private gallery. Enjoy! ☐

Donna Sanders has been a freelance writer specializing in wildlife art for the past 14 years. She has been published in more than 45 periodicals.

Courtesy of the artist and Mill Pond Press, Inc., Venice, Florida 34292



Up in the Pine—Great Horned Owl, 1979

This is one of my most abstract paintings. It is particularly apt for The Living Bird Quarterly *because the way most birders and ornithologists see birds is with great difficulty, particularly in the case of owls.*

I have long admired the swinging shapes of Oriental calligraphy and the bold, loose strokes of the abstract expressionist painters such as Kline and Soulages. Their art helped me to see my world with new eyes. Thus I saw the potential for my own art in the rhythmic dark environment of the great horned owl.

Robert Bateman
Fulford Harbour, British Columbia

BHL

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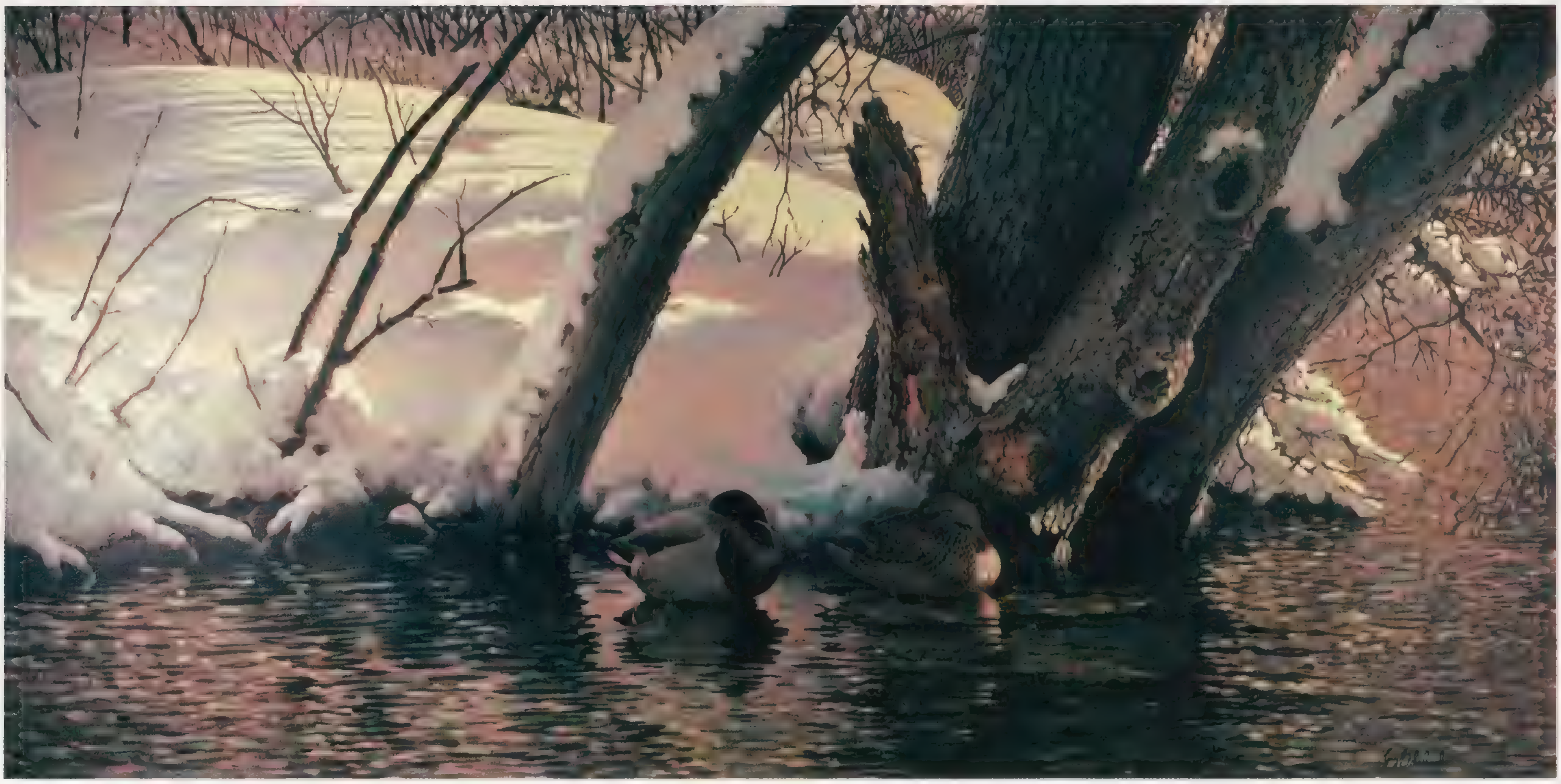


Courtesy of the artist and Leigh Yawkey Woodson Art Museum, Wausau, Wisconsin 54701

Brightwaters Creek—Mallards, 1983

Brightwaters Creek *is an emotional scene impressionistically rendered and very pleasing to me because it showed that prints of such works can sell.*

Guy Coheleach
Bernardsville, New Jersey

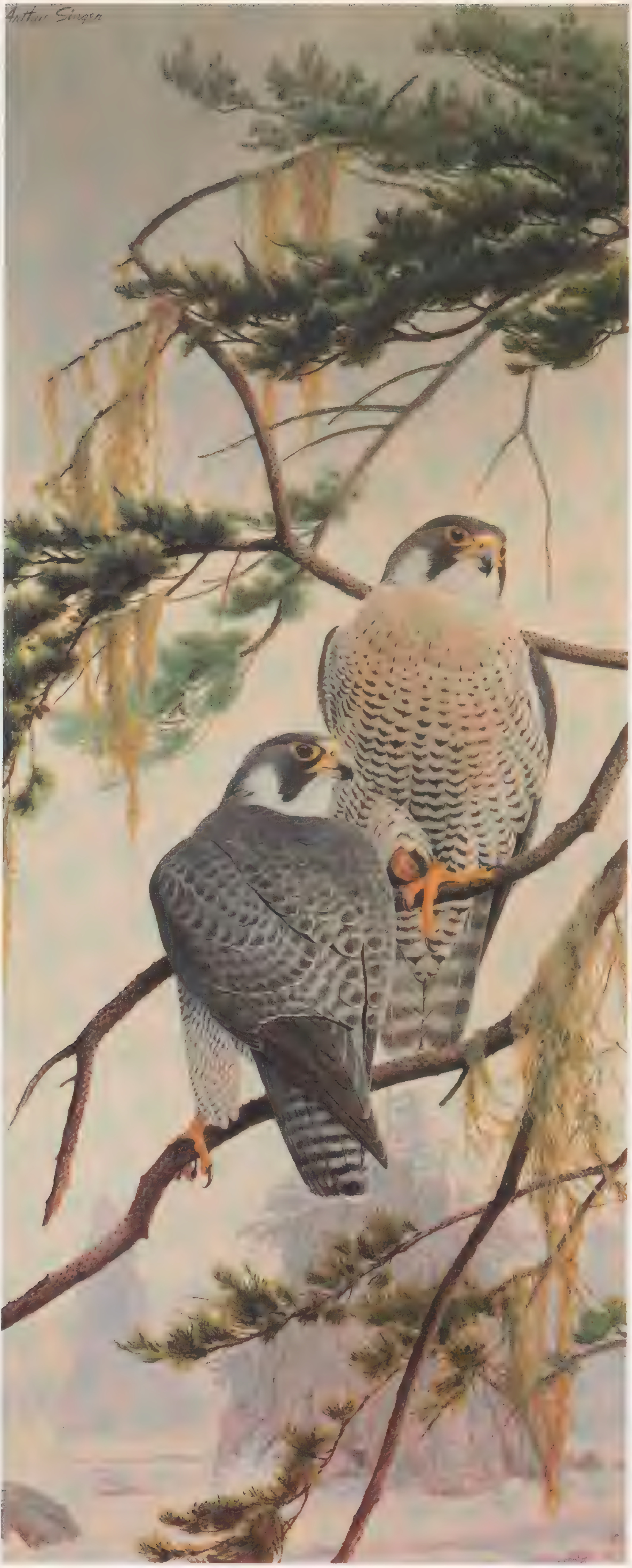
Water's Edge—Canada Geese, 1985

It is the ultimate dream of artists to be recognized by American Artist *magazine.* Water's Edge—Canada Geese *was its November 1985 cover painting. Since it was so important to me, I designed the painting using my favorite habitat—the wetlands of America. Canada geese gave the strongest contrast in color values and easy identification of the birds. I struggled. It was fun. It was successful.*

Maynard Reece
Des Moines, Iowa

Courtesy of the artist and Mill Pond Press, Inc., Venice, Florida 34292

Courtesy of the artist

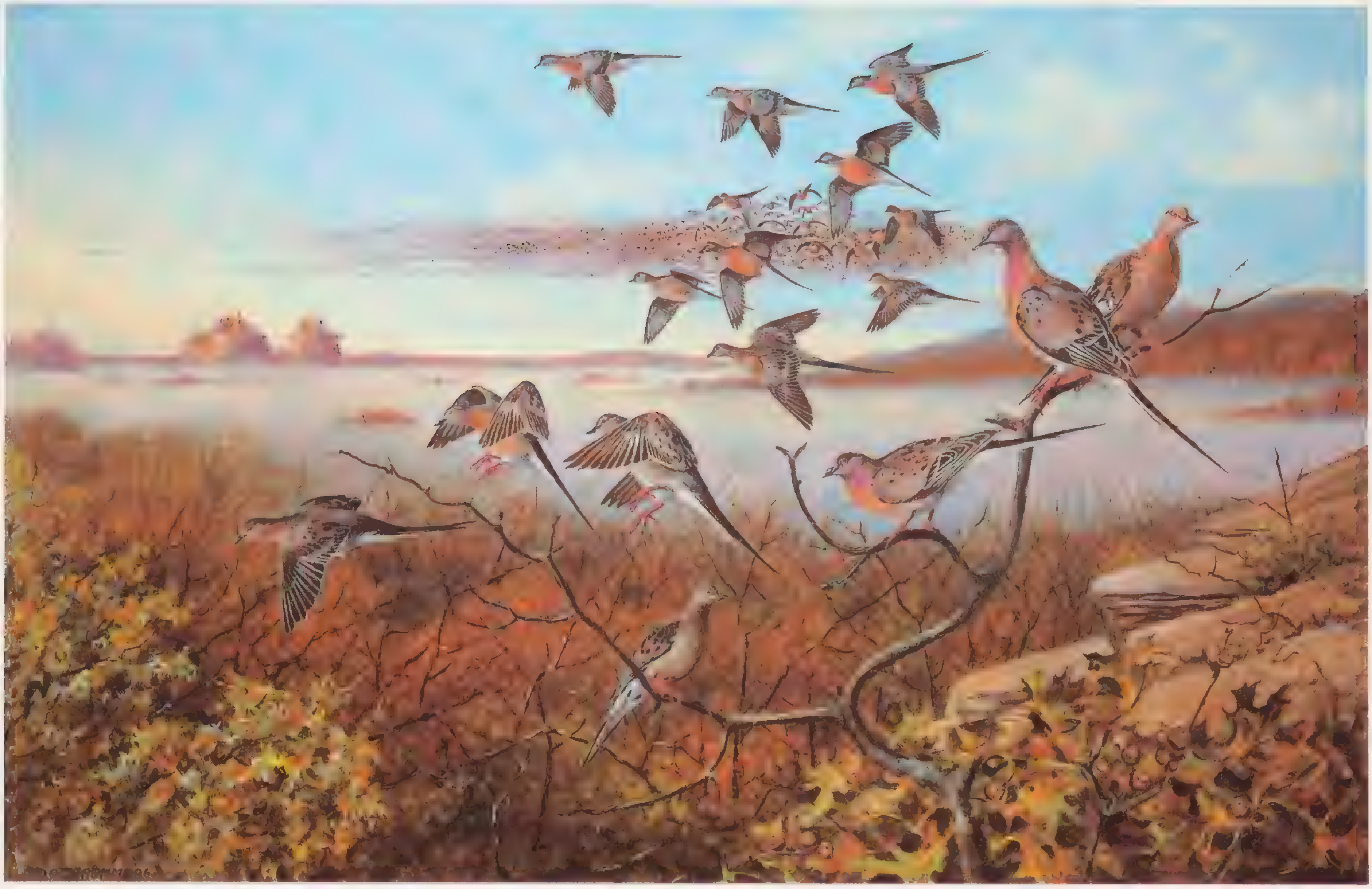


Peregrine Falcons on the Oregon Coast, 1978

This painting is but one of my favorite works, but since I must make a choice, I have selected this. I've always been attracted to birds of prey, and, along with the eagle, the peregrine falcon is, to my mind, one of the most exciting. It was also very much endangered by insecticides in the wild. I felt that painting the beauty of this bird might make the public more aware. The reaction of the public was immediate, and within three weeks of publication, all prints were sold.

I had this idea in the back of my mind before ever painting it. Both the impressions of the Oregon coast and my feelings about the bird seemed to make a perfect combination for a composition that embodied an Oriental quality in its design. The mood of the coastline on a typical misty day reflected my emotional feelings at the time. During the month it took to complete the painting, I lost my wife of 37 years. Innumerable visits to the hospital occurred between periods of painting. I painted with great intensity of emotion, and it flowed easily.

Arthur Singer
Jericho, New York



Courtesy of the artist and Stanton and Lee, Madison, Wisconsin 53705

Distant Thunder—Passenger Pigeons, 1986

This is the first painting in my endangered species series. I have humbly set out to do with this series what Aldo Leopold did with his words. I believe that these paintings will be the most important paintings I have ever done. Look closely, it is all there on my canvas. It is the whole story. It is what we must remember. The passenger pigeon is the *symbol of extinction, an extinction we all face if we do not act.*

Owen Gromme
Portage, Wisconsin

RICK STRIMBECK

Invasion of the Brekkie Snatchers

Rick Strimbeck

Shrill screams, wicked, curved beaks: they're not creatures from a horror movie, they're keas, large parrots that inhabit the mountains of New Zealand. There they pester hikers for a bit of breakfast and apply their inquisitive instincts and razor-sharp beaks to rotting logs and expensive outdoor gear with equal alacrity.

A thump overhead wakes me. Over the drumming of rain I hear clumsy, rapid footsteps, a shrill scream, something sliding. I open my eyes, prop myself up on one elbow, and look out the window, my vision still blurred by sleep. By the dim dawn light I see a spreading, dark-leaved tree, cloaked in hanging ferns and mosses, framed by the window and the eave of the roof.

A small upside-down head hangs over the dripping eave, peering at me through the window. It is a parrot head, with a heavy gray bill as meanly hooked as an eagle's and the intelligent eyes of a crow. As I watch, the bird tips over, hanging from the gutter by its feet. It is a dull green, but as it drops to the stump I glimpse underwing and rump flashes of bright orange, and iridescent blue wing and tail feathers. Its feet seem huge, out of proportion to the plump, crow-sized body, with two toes pointing front and two back, like those of a woodpecker. The bird raises the feathers on its head and rouses me completely with another chilling scream.

The bird is a kea. I'm in New Zealand, working as a hutkeeper at Mintaro Hut, on the Milford Track, in Fiordland National Park. The park occupies a sizable chunk of the southwestern corner of the South Island; the track—as New Zealanders call their hiking trails—runs 33 miles from a glacial lake, Lake Te Anau, up a deep river valley, over an alpine pass, and down a second river to Milford Sound, the northernmost of several fjords on the west coast. Low in the valleys the track passes through dense temperate rainforests of small-leaved evergreen beeches and strange southern conifers. Higher, open, avalanche-swept areas are occupied by monstrous ferns. The steep valley walls are laced with cascades fed by torrential rains, and carpets of grasses and shrubs cling to all but the steepest slopes. Separating the valleys are lines of jagged 7,000-foot peaks, the upper reaches crusted with glacier ice. The glaciers retreated up the mountainsides only 5,000 to 10,000 years ago, leaving behind the gouged and scoured landscape that is the home of the kea.

The bird outside my window I know well: my friend and nemesis, Jack the Ripper, a particularly bold adult male who has kept me company, whether I wanted it or not, since my first days at the hut. Today, as every day, he is here with high hopes of a little something for brekkie or, failing that, perhaps a nice tender pair of boots or a Gore-tex raincoat to tear apart. I hear two more thumps in succession: Jack's aunt and second cousin, no doubt. Soon the whole mob will be here, ready to party.

I put on a raincoat and head for the outhouse. A northwest wind drives a steady rain over Mackinnon Pass, and gusts shake big drops off the silver beeches. Over the trees and under the thick cloud I see the bottom few hundred feet of the southwestern face of Mount Balloon, the gray rock laced with falling water. As I pass within arm's reach of Jack, perched on his stump, he cocks his head and eyes me defiantly, working his lower mandible up and down.

A kea's sharp bill is designed for tearing rotting wood as the bird searches for the insects and grubs that, along with buds, berries, seeds, and nectar, make up its natural diet. By jutting its lower mandible forward so that the sharp tip meets that of the upper, the kea has a grip as precise and powerful as a pair of needlenose pliers. The bird's varied diet is coupled with an instinct for investigating anything unfamiliar, probably as a potential food source. Human objects seem to be especially enticing. At times, a kea's persistence in the absence of apparent caloric benefit seems to go beyond the bounds of instinct. Given the opportunity, a kea can be as cheeky, mischievous, and destructive as an eight-year-old with a pocketknife.

Life at Mintaro Hut, which provides overnight accommodations for hikers, is a life under siege. Nothing left outside is safe. Boots, raincoats, sacks of flattened cans—all are attacked with ferocity. I have seen a pair of boots reduced to the soles overnight, raincoats shredded, insulation stripped from antenna wires. One visitor hung his sleeping bag out to dry while he went for a day hike. Goose down blew around the hut for weeks.

Jack is the ringleader, the biggest troublemaker of the 20 or so keas that visit Mintaro. He befriended me early in the summer when there were few hikers around, arriving faithfully, morning and night, rain or shine. Keas are not fair-weather friends. Charmed, I fed him bits of bread and meat, and from the first day he boldly took food from my fingers, stretching his neck to take morsels gingerly in the pinch grip of his bill. He would hold larger food items in one foot, balancing on the other while he tore pieces off. He was good company.

But as Christmas neared and more people visited the hut, Jack began inviting his friends and relatives.

A ROTTEN LOG, AN EMPTY TIN, OR A TOE

The kea is a type of parrot that lives high in the mountains of New Zealand's South Island. It nests deep in rock crevices, under tree roots, or in hollow logs. It feeds in trees or on the ground and is often seen flying across mountain gorges, sometimes wheeling about in wide circles. The bird's name is an onomatopoeia of its strident call while in flight.

In New Zealand's national parks, keas are renowned for their bold, mischievous, and destructive behavior around huts and campsites. They do not hesitate to approach any object that will sit still long enough to be investigated, be it a rotten log, an empty tin, or the toe of a napping hiker. The kea's fearlessness may have evolved because of an absence of large predators; prior to the arrival of humans, the only mammals on New Zealand were two species of bats. Not until the Maoris immigrated from Polynesia less than a thousand years ago, bringing dogs and rats, did the kea have any serious enemies.

The arrival of British settlers in the 1840s initiated a remarkable change in the diet—and behavior—of some keas. Settlers established sheep stations in the grassy foothills of Central Otago, under the shadow of New Zealand's highest mountains. The offal and skins discarded when sheep were slaughtered and the carcasses of weather-killed sheep provided easy pickings for the adaptable birds. Groups of keas near these stations have since shifted from an herbivorous-insectivorous diet to one that includes scavenged meat.

Newspaper accounts from the turn of the century accuse keas of slaughtering healthy sheep. These accusations were enough to encourage the payment of bounties. As a result, thousands of birds were shot annually, even into the 1940s.

In a 1962 study published in the New Zealand ornithology journal *Notornis*, J. R. Jackson examined alleged eyewitness accounts of kea attacks. He found that many of the behaviors attributed to keas—in particular wallowing in gore and clinging to the backs of fleeing sheep—in fact are never exhibited by the rather fastidious and easily startled birds. He conceded that birds may harass or attack living sheep weakened by disease, injury, or deep snow, but concluded that keas cannot be held responsible for the slaughter of large numbers of sheep. The "joyriding" by keas of healthy sheep seems to be a popular myth.

When keas and humans meet these days, the birds find little to discourage their boldness. To humans, keas are an endless source of amusement; to keas, humans and their artifacts are a source of food or a little something on which to sharpen their bills. Perhaps keas find humans amusing, too.—R. S.

Kea feeding on horse carcass. Carleton Ray (Photo Researchers, Inc.)

Killer Birds Devour Living Flesh: Eyewitness Reports!

Accounts of keas' bloodthirsty attacks on sheep were first published in the *Daily Otago Times* in 1868. Similar reports followed in many other New Zealand newspapers during the next few decades. At a meeting of the Philosophical Institute of Wellington around the turn of the century, however, it was suggested that "the mutton-eating habit attributed to the kea . . . was a myth." Investigating this contention, George Marriner, an assistant at the Biological Laboratory at Canterbury College, New Zealand, wrote in 1906 in the journal *Transactions of the New Zealand Institute*, "though nearly 50 years have passed since the record was first published . . . I cannot find one writer who says that he ever saw a kea attack a sheep."

W. B. Benham, a professor of biology at the University of Otago, complained in the same journal that "it was very startling to be informed that the flesh-eating habit was nonexistent in fact, and had existed only in the imagination of certain sheep owners and their shepherds. For years biologists have been using this alleged change of behavior to illustrate that variation in behavior, as well as in structure, occurs in nature; and to be told now that the change in behavior is quite mythical is extremely disconcerting."

Not one to be deprived of his pet example, Benham went on to say that he didn't have any scientific evidence *refuting* the kea's carnivorous reputation; quite the contrary, he had gathered many eyewitness reports of kea attacks on sheep.

Benham assembled voluminous correspondence documenting kea attacks which fall into three progressively more gruesome categories: keas harassing sheep, keas wounding sheep, and keas devouring sheep. Some of the most graphic descriptions follow.

A letter by Mr. R. McKenzie vividly exemplifies the first category. "I have seen a kea attack and hang on to a living sheep. . . . The frenzied sheep jumped and ran about in any direction for dear life, then, separating itself from the mob, made a direct line down a steep slope, and in its mad career finally dropped over a precipice, until which moment the bird held on with its claws, its wings slightly extended as if to steady itself or to be ready to fly off at any moment. The instant the victim left *terra firma* the bird relaxed its hold, but was observed to fly straight down as if bent on securing the sheep. Both were then lost to view." The gory scene that must have followed is left for us to imagine.

Or if imagination fails, consider the following blood-curdling scenario, from a letter by Mr. J. A. Wraytt published in the *Otago Witness* in 1905: "I saw a sheep . . . kneeling down with its head poked under a shelf of rock. There was a kea on its back, and about a half a dozen sitting on the rocks close by. . . . On going down to the spot I found the sheep, which was or had been a strong fat one, with most of the wool stripped off its back and lying around in small tufts. There was a large hole through the sheep's loins into which the kea kept diving and filling its mouth. The others had apparently had their fill, as their heads were drenched with blood."

Many reports of kea attacks mentioned that the birds focused their attacks on the sheep's "loins"—it was generally believed that the birds preferred the kidney fat to all other parts of the animal. Benham's informants charged that, having acquired a taste for meat, keas rapidly learned to strip carcasses to the bone, and even to crack the bone to suck the marrow.

Sometimes the victim was not yet a carcass. Pity the poor "snowed-up" sheep sighted by Mr. E. Cameron: "A snowslide carried a sheep with it. I happened to be on the hill. . . . It was all covered with snow but its nose and one hind leg, but still alive. The uncovered leg was eaten to the bone—not a scrap on it—with half-a-dozen keas fighting over it."

Did Benham feel that these eyewitness accounts were reliable? Yes, the professor contended, "surely we may credit these men, directly concerned as they were, with sufficient intelligence to investigate the facts with enough care to convince themselves that the losses were due to keas.

"It has been suggested," he went on, "that it was in the interests of shepherds . . . to exaggerate the loss, so that the bonus on kea-beaks might be kept high." But, declared Benham, mustering the ultimate argument, "I should imagine that astute men of business, and Scotchmen to boot, would scarcely be befooled by their men."—*Cynthia A. Berger*

Soon I had a mob arriving in the wee hours of the morning, returning at suppertime, and staying until late at night. The thuds of their landings and the shrill cries of their squabbles on the roof sounded like a nonstop dance party in an upstairs apartment. I soon began to warn hikers about the keas' vandalistic habits, asked them not to feed the birds, and gave up the practice myself. The keas took to spending a little less time around the hut, but they remained a daily fact of life at Mintaro.

On one of Fiordland's rare sunny days I was behind the hut hanging my laundry when I heard a crash inside, reminding me that I had left the door open. Several more crashes sounded while I ran around front.

Jack was working his way down my shelves, systematically tipping over containers of food, while two other keas screamed encouragement from the doorway. Jack's wingtips grazed my shoulder as he made his escape, leaving behind a morass of milk powder, tinned jam, and instant coffee. I cursed him roundly and cleaned up. As I got to the last few swabs, I heard more excited calls from behind the hut. I ran around back to find Jack working his way down the clothesline, pulling off pins. The second kea was ripping holes in a fallen T-shirt, while the third hung upside down by one foot from the hem of a towel, tearing it with its bill. Jack's initial assault inside the hut seemed to have been a clever distraction, part of a well-executed plan of attack.

Mintaro is one of four huts on the Milford Track where keas come for handouts. Just beyond the summit of the track, on Mackinnon Pass, is Pass Hut, a small A-frame shelter that serves as a lunch and tea stop for the 60 or so hikers who traverse the pass on busy days. Weather permitting, the view here is dominated by Mount Eliot, with the fractured ice-blue Jervois Glacier hanging on its flank. Beyond that, more snow-clad peaks march westward to the Tasman Sea. To the south, Mintaro Hut is a tiny gray rectangle in a clearing by a small, deep blue lake, dwarfed by the twin lines of peaks that loom over the Clinton River valley.

On all but the foulest days, the keas are more than happy to entertain hikers at Pass Hut in exchange for scraps. The moochers arrive mid-morning, jostling for the prime spots on the rocks in front of the door. A kea defending its turf lowers its head, droops its wings like a tom turkey, and screams bloody murder—sometimes going so far as to flail at the intruder with wings and talons—while another sneaks up from behind to take its place. The action peaks during the lunch hour when scraps of sandwiches and cookies fly and the keas rush after them with no more dignity than ducks on a city pond.

At times like this the birds seem prostituted, sold to the highest bidder. In more remote valleys they spend their days licking nectar from the flowers of forest trees, plucking berries from alpine plants, or soaring over the crags, advertising their presence with their far-reaching call. But here at Pass Hut they are reduced to a common rabble, squabbling over scraps of white bread and processed meat at the feet of their human domesticators. It takes me a moment of reflection to see beyond the cheekiness and charm, and I wonder if it is right for us to feed them.

Late in the season I climb Mount Balloon with two friends. We ascend by the steep, knife-edged north ridge, then descend from the summit to a vantage point looking down on Mackinnon Pass. It is late afternoon. The sun hangs low over the Tasman Sea and the water gathers the hot light, forming a bright sliver of gold tucked between a jagged line of peaks and the pale sky.

GERALD CORSI

Given the opportunity, a kea can be as cheeky, mischievous, and destructive as an eight-year-old with a pocketknife.

A solitary kea circles over us, quiet except for the rush of wind in his wings. I think it is Jack, from the bold way he looks at me as he lands. He hops to a boulder at the edge of the cliff and stands silently for a few minutes, looking first at us and then at the burning sea. He picks up a pebble in his bill, hops deliberately to the edge of the cliff, and, stretching out, lets it fall, cocking his head to watch it drop. Then he looks back at us. The odd series of actions carries the weight of an omen, a cryptic message from a mountain god telling us it is time to go. He watches as we pack up. As we turn our backs on him to begin the long scramble back to the hut, Jack spreads his wings and drops off the cliff, taking his own way down. □

Rick Strimbeck worked for two seasons as a hutkeeper in Fiordland National Park. He now lives in Vermont.

New Gulls from the Old World

She deserves a nickname, perhaps "E. D." for East Dike. She first appeared at the East Dike of New Jersey's Brigantine National Wildlife Refuge in March 1986. The "she" was a guess, based on size. Female lesser black-backed gulls tend to be smaller than males, and E. D. was particularly diminutive. Her age was more certain. Her legs were pink, her wingtips were dark and unspotted, and her tail ended in a crisp, wide band—all field marks of a two-year-old bird.

Brigantine's East Dike is a good place for gulls. Marshes and mudflats that run for miles to the north and east provide excellent feeding areas, and the dike provides protection from the wind and safety in numbers. Dozens of great black-backed gulls and hundreds of herring and ring-billed gulls cluster there every night through winter and spring. E. D. lingered with them for at least a week on her first visit.

She appeared again on the East Dike five months later, in August. Her legs were still pink, but she had molted her feathers and now wore the plumage of a third-year gull: her wingtips showed small, white spots, and her tail, a speckled and smudged grayish white, had lost its band.

For a few weeks birders searched her out among the Wilson's phalaropes, gull-billed terns, black skimmers, and other birds of Brigantine's summer. But she stayed too long and was found too easily to raise eyebrows. She could be seen almost any time of day somewhere along the dike, most frequently in the northeastern corner, and she stayed from late summer to early spring. She was last reported on April 4, standing on the dike, 10 feet from the road.

When E. D. returned to the East Dike again in August 1987, few refuge visitors seemed to care. Although now in adult plumage—bright, white "mirrors" on her wings, spotless white tail, yellow legs—she hardly rated mention in the sightings book at the information center, and birders cruised past her corner without even stopping, chasing rough-legged hawks or snow buntings.

Thirty years ago, even 10 years ago, a lesser black-back tarrying so long in a single spot in New Jersey would have caused a sensation. But now, *Larus fuscus* seems to have become a new member of the North American avifauna while we shrugged with indifference.

The first lesser black-backed gull recorded in the United States was reported at Beach Haven Inlet, New Jersey, in September 1934 by Charles Urner and James Edwards. The first specimen was collected at Assateague Island, Virginia, in 1948. Reports increased only slightly through the '50s and '60s, and a typical winter was 1971–72 when two lesser black-backs were recorded on the nationwide Christmas Bird Counts—one in Ithaca, New York, the other in Tampa, Florida. Since then, the gulls' numbers have increased dramatically each year. The 1985–86 Christmas Counts recorded lesser black-backs on 22 different areas in 11 states. On the 1986–87 Christmas Counts 39 different areas in 14 states, including California, recorded them. Lower Bucks County, Pennsylvania, had 12 individuals.

"It's simply not a rarity anymore," says Rick Blom, editor of *Birding* and an inveterate gull watcher. "Ten years ago people chased after lesser black-backs. Not any longer.

Ten years ago a lesser black-back lingering in New Jersey would have caused a sensation. Now, *Larus fuscus* seems to have become a new member of the North American avifauna while we shrugged with indifference.

"We're seeing them in August here in Maryland. They're commonly reported in winter in Florida, and in the Caribbean a dark-backed gull is more likely to be a lesser black-backed than a great. It's hard to believe all these birds are coming from Iceland or Europe. No nests have been found in North America yet. But there's a huge amount of potential breeding territory in northeastern Canada that receives minimal censusing, and it would be easy to lose, say, 50 or 100 pairs of lesser black-backs in a colony of 10,000 herring gulls."

"There's no question that lesser black-backs are breeding in North America," says P. A. Buckley, research professor of ecology at Rutgers University and director of the Coastal and Marine Park Program of the National Park Service. "There are simply too many records too early in the season. They can't all be coming from Europe."

Blom believes that the lesser black-backed expansion can be partly explained by the exponential increase of human garbage and waste over the last 20 or 30 years. "Ordinarily, a major cause of bird mortality is starvation on the wintering grounds. By increasing the feeding opportunities at landfills, dumps, sewage lagoons, and outflow pipes, we're enabling more gulls to survive the winter, and you only have to reduce winter mortality a little to triple the population in 20 years.

"We're seeing an explosion of gull numbers on both sides of the Atlantic," Blom continues. "The great black-back, for example, used to be a rare bird in Maryland. Forty years ago you might have seen half a dozen in a typical winter. Now you can count 1,700 or 1,800 great black-backs here, and they're coming to landfills 70 miles inland. They're nesting regularly from Maryland south all the way into Virginia and occasionally in North Carolina. Herring and ring-billed numbers are way up also."

Blom finds it interesting that the lesser black-back is seen in the United States much more frequently than several other gulls common in the Old World: the mew (or common) gull, and the European races of the herring and Iceland gull. None of these appear on our side of the ocean with any regularity.

"One reason lesser black-backs reach us more often is their migration pattern. The race of lesser black-back we see here, *Larus fuscus graellsii*, has one of the longest migrations of all gulls, and a lot of that migration is westward. That means it's more likely to stray westward from Iceland and Great Britain than the mew gull and the other Old World gulls that are short-distance migrants. The two others that do reach us from Europe, the little and the black-headed, are both long-distance migrants."

ARTHUR MORRIS

Lesser black-backed gull, Cape May, New Jersey.

The little gull, whose primary breeding areas are in Siberia and northern and eastern Europe, first nested in North America in Ontario in 1962. Now it winters regularly along the Atlantic Coast of the United States. It is also a "rare but regular" visitor to California and has strayed to Colorado, New Mexico, and Alabama. The black-headed gull's first North American nesting was in Newfoundland in 1977. It had colonized the Madeleine Islands in the Gulf of St. Lawrence by 1982, and nested for the first time in the States at Monomoy National Wildlife Refuge, Massachusetts, in 1984. In the last 10 years it has become an expected winter visitor along the East Coast from New Jersey north. A fourth Old World gull, Ross' gull, has also invaded North America.

Buckley wonders if a genetic change has contributed to the range expansions. "All species are trying to expand in all directions at all times, but usually they're not successful. Occasionally, though, a species—or a certain population of a species—seems to undergo a genetic revolution that makes it better adapted to colonizing new territory. This is probably what happened to the glossy ibis, cattle egret, and fulvous whistling duck. All three have expanded their breeding ranges and their numbers enormously in this century. The glossy ibis, for example, probably first reached North America in the 1700s, but we had only a tiny population here for 150 years. Then suddenly, boom! They were breeding all the way up the East Coast. Maybe that is what's happening to the lesser black-backed, black-headed, and Ross' gulls. I wouldn't put the little gull in that category—it really isn't doing so well."

The little gull, ironically the first of the Old World gulls to nest in the United States, might be the one with the least certain future. It nested at Green Bay, Wisconsin, in 1975, and has bred more recently at other spots around the Great Lakes, but its status as a continuing breeder is questionable.

"It's not a dump bird, and its population has never really taken off," Blom notes. "It seems to have gotten a tenuous foothold here, and then to have run into competition with Bonaparte's gull. It may already be declining. The little gulls reported each winter from Long Island south to Cape Hatteras may be North American breeders, but the ones seen north of Long Island along the New England coast are probably coming from Iceland."

"As far as I know, there is no consistent breeding site for little gulls in North America," Buckley observes. "The species seems to be bouncing around, a pair here and a pair there. Of course, the little gull is an uncommon bird even in western Europe. It's an ecological specialist, with specific prey needs, so it is much less widespread than the black-headed, which is more of a generalist."

"The black-headed is not really much of a dump bird either, but it does come to sewage lagoons and outflow pipes, and its numbers are definitely increasing," says Blom. "It's another bird people don't bother chasing anymore. You can see flocks of 80 birds around Boston Harbor."

Like gull watchers everywhere, Blom and Buckley are fascinated by Ross' gull. Twenty years ago, there were no records of the species in the continental United States, and the species' breeding territory was believed to be limited to the Arctic Ocean coast of Siberia from the Taymyr Peninsula east to the Kolyma River delta. In the winter of 1974–75, however, an adult Ross' gull appeared at Newburyport, Massachusetts, and lingered for five months. In the last 10 years there have been at least nine other published reports of Ross' gulls straying into the United States, and, even more astonishing, nesting sites have been discovered at Churchill, Manitoba, and at half a dozen other areas in arctic Canada.

"Clearly, something new is going on with Ross' gull," says Buckley. "And it might be genetic. We had a single record of a possible nesting at Disco Bay, Greenland, back in the 1880s and then nothing until the last decade or so. Suddenly the species has just gone crazy. Evolutionarily, it was instantaneous."

Blom wonders if the apparent speed is an illusion, though. "Maybe the Ross' expansion is like the wheatear's. The wheatear is an Old World species that has moved into the New World very slowly, eastward from Siberia into Alaska and the Yukon, and westward from Iceland into Greenland and Labrador. It is possible, given the harsh nature of the arctic environment, that it took wheatears the tens of thousands of years since the last Ice Age to expand, mile by mile, as far as they have. Perhaps what's going on with Ross' gull is the same story—an extremely *slow* expansion—and the pairs nesting at Churchill and those few birds wandering down south into the United States in winter are the leading edge of that expansion.

"Our perspective on expanding species has been warped by the house finch, the house sparrow, the starling, and the other, more dump-oriented gulls. Those birds fill new ecological niches humans have created, so their numbers have increased dramatically. Wheatears and Ross' gulls aren't fitting into a new niche, except in the sense that the land where they're nesting now isn't covered by a glacier anymore."

"If there is one thing that most surprises me about these recent gull reports," says Buckley, "it's the inland records of Ross' gull, from Colorado and elsewhere. We used to think of Ross' as an oceanic and high-arctic species. Churchill is *low* arctic, below the treeline. If those few individuals wandering away from their traditional wintering and nesting areas are breeding successfully, the whole species could change. There would be enormous selective pressure. How often Ross' gull breeds is simply not known. Maybe, like albatrosses, they breed only every couple of years. This is sheer speculation, of course, but if the Siberian birds are nesting only every two years and the North American pairs nest every year, the American birds would have a reproductive advantage."

Will the increase in numbers of gulls continue unchecked? Blom thinks not. "We're beginning to see a change in how we handle our garbage. For environmental and political reasons there's more and more pressure to make cleaner landfills, to stop leaching, and to process waste more carefully. The EPA is beginning to put a lot of money into sewage treatment plants, for example. It might take 50 years, but sooner or later we're going to stop increasing feeding opportunities for gulls. Then, we're going to start decreasing them. This will be a wonderful opportunity to study how much of an impact we have had on gull populations. By then we should have stable colonies of lesser black-backs in North America. What will happen to them?"

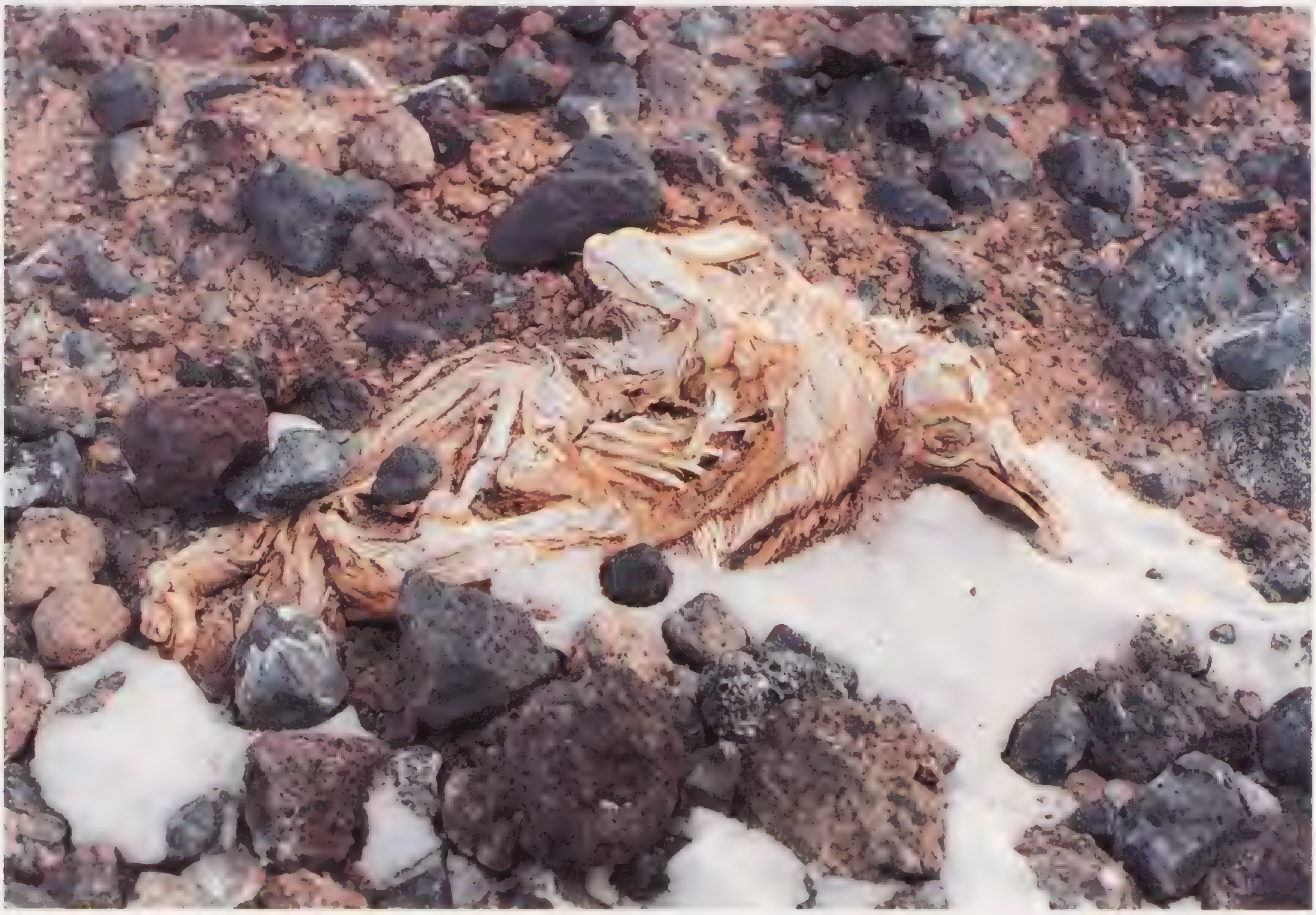
In the meantime, you can drive out on the Brigantine dikes and wait for New Jersey's best-studied lesser black-back to return to her favorite corner. Her plumage tells us she was born in the summer of 1984 and would have been old enough to breed in the summer of 1988. Where did she go during the nesting season? Newfoundland? Labrador? Nova Scotia? Did she find a mate?

If E. D. did remain on this side of the Atlantic and all went well, her first young will have fledged before you read this. By now they might be dispersing down our coast, New World gulls through and through. —**Jack Connor**

E. D. appeared at Brigantine's East Dike for her third successive winter in October 1988.

Another Old World immigrant, the cattle egret, now has a large range in North America. Crossing from Africa to South America at the turn of the century, the egret gradually spread north, reaching southern Canada by the 1960s.

C. C. LOCKWOOD



BRIAN E. JOHNSON

Failure or Success?

I never imagined that I would get any closer to Antarctica than the pages of a book. Yet here I am, a mere 800 miles from the South Pole. I have come to Ross Island to study two species of penguins, the emperor and the Adélie.

It is the third week in October, well into the austral spring at Cape Crozier, one of the most southerly penguin breeding grounds. The rookery is deserted: the Adélies have not yet begun to return from the pack ice where they have passed the winter. In contrast to the tumultuous noise and turmoil of the colony during the breeding season, the silence is broken only by the sound of the wind. The emptiness imparts an eerie feeling.

The remains of young from previous years litter the rookery; many of the corpses are quite old and have been mummified by the cold, dry air. These are the unfit. Whether through poor parental care, physical or genetic weakness, or bad luck, these young birds were not successful in their bid for life.

As individuals they have failed to pass on their genetic heritage, yet in death they have ensured the survival of the species. Only the fittest birds—the strongest and best equipped to survive nature's gauntlet—will return to breed.—**Brian E. Johnson**

A Lake for a Legacy

David Gaines. I see him walking along a street in Lee Vining, California. He's playing a mandolin, which takes two hands, so he's using his feet to push his son, Sage, along in a stroller. His daughter, Vireo, is riding nearby on a tricycle. The kids are smiling, as is Dave, and a wind is ruffling his beard and unruly hair.

I hear the notes plucked from the eight-stringed instrument and Dave's clear voice singing a tune. It's called "Desert Song," and it's one of his favorites. Then he switches the beat. Now he's singing a song he wrote about Mono Lake, the cerulean expanse of water reposing below the town, which Dave has been trying to save for 10 years from the thirst of distant Los Angeles.

Unfortunately the scene is from a photograph, the music from a tape. Even more unfortunate, the picture and recording are about as close as I'll ever come to meeting Dave. On January 11, 1988, on his way back to Lee Vining from an errand in nearby Bishop, Dave and a friend, Don Oberlin, died in a car crash amid blinding snow.

Dave's death sent a shock through the conservation community, not only because the fight to save priceless Mono Lake had suffered a damaging blow, but because Dave was an extraordinary person, one many people likened to a latter-day John Muir. For 10 years he had crusaded to preserve the lake, not by shouting that the sky was falling, but by showing love and understanding for a poorly known natural wonder. Until Dave and several friends formed the Mono Lake Committee in 1978, the mysterious body of salty water, crucial to the survival of millions of breeding and migrating birds, had been practically ignored—except by the Los Angeles Department of Water and Power, which, since 1941, had been slowly siphoning Mono's waters to L.A.

In March 1988 my photographer wife, Judy Burrill, and I journeyed to California to visit Mono Lake. We had originally planned to tour the Mono Basin with Dave, not only to gather material for an article, but to meet the man so often described as a visionary. We wanted to experience his magic and the personality that had inspired the Mono Lake Committee to keep the faith for a lake often called useless. When we learned of Dave's death, visiting Mono Lake and writing about him and his accomplishments seemed even more important.

Spring comes late to the high desert, and we arrived in Lee Vining, a tiny town at the foot of the mighty Sierra Nevada Mountains, on a cold, blustery morning in late March. After breakfast in the town's only open restaurant we rendezvoused with Emilie Strauss, the Mono Lake Committee's knowledgeable staff biologist, and Lauren Davis, the committee's editor and a gifted writer. Soon we were in Emilie's tiny car, bouncing through the desert on a rough dirt track. "We'll answer all your questions," these amiable women told us, "in an appropriate place."

We soon found one. A half-hour's drive and a 45-minute walk brought us to an impressive sand dune in the middle of the Mono Basin, and when we puffed to the top, we beheld a tremendous view. To the west rose the Sierra Nevada—snowcapped, fissured, majestic. To the east stretched the desert—barren, dark, forebidding. Before us lay the lake, 8 miles wide by 13 miles long, its shallow waters glistening in the morning sun. And there on the dune, with the spirit of the basin all around us, we listened as Emilie and Lauren described Mono Lake's biology and explained why the lake is vanishing, why it's important that it be saved, how the Mono Lake Committee was formed,

JUDY BURRILL (2)

California's Mono Lake is famous for its formations of tufa (above). The lake is also crucial to the survival of millions of birds, and the Mono Lake Committee, working from a visitor center in Lee Vining (right), has been trying for 10 years to save the lake from the thirst of distant Los Angeles.

and what the committee has done.

Mono Lake was born about one million years ago and may be the oldest lake in North America. It's also one of the most unusual. It sits on the edge of a desert with no other lakes for neighbors. It is salty and loaded with minerals. And it's extremely important to the survival of millions of birds.

By 1981 the lake had dropped 46 vertical feet. Its volume had been halved and its salinity doubled. . . . On gusty days the wind stirred up dust clouds that billowed for miles, creating a health hazard for anything that breathed.

Water enters the lake partly from rainfall and underwater springs, but mostly from snowmelt off the adjacent Sierra Nevada. As the frigid water rushes down from the lofty peaks and across the sagebrush plains, it picks up salts and minerals from the rocky stream bottoms, depositing these materials in the lake. Because the lake has no outlet, the only way water can leave is through evaporation. And when the water evaporates under the hot summer sun the salts and minerals remain behind, leaving the lake water three times as salty as the ocean—too salty for fish but not for brine flies, harmless insects that blacken the shoreline, and brine shrimp, tiny creatures that look like white feathery worms and can be collected by the bucketful.

These unusual creatures are central to the lake's popularity with birds. Best known are the California gulls, which, during the summer breeding season, fill the air with their squalling as they raise their young on a regurgitated swill of nutritious brine creatures. Some 50,000 birds, 85 percent of all the California gulls that breed in California, nest on one of the lake's lava-strewn islands.

But Mono Lake is important to more than breeding birds. It is also a crucial stopover for migratory shorebirds and waterfowl, especially phalaropes and grebes, which pause there to rest and feed while on their long journeys south from breeding grounds to wintering grounds. Each autumn up to 150,000 Wilson's phalaropes, 55,000 red-necked phalaropes, and 800,000 eared grebes—about one-third of the eared grebes in North America—depend on Mono Lake for the food they need to cross hundreds of miles of otherwise waterless desert.

Yet birds and brine shrimp and flies are not the only ones who find the lake valuable. It's also important to people, from those who glance at its shining waters while whizzing past on Highway 395 to those who visit to swim, boat, watch birds, or marvel at the lake's famous tufa towers. These bizarre formations of limestone look like giant spongy creatures from a "Star Trek" movie and feel like broken glass. They are formed under water as calcium-bearing freshwater springs bubble up through the lake's carbonated brine, and they are exposed by the lake's receding waters. Nowhere else on Earth does tufa appear so abundantly and beautifully as in Mono Lake.

But unfortunately for the birds, the brine creatures, and the people who treasure this unique lake, the city of Los Angeles, 350 miles away, is very thirsty. In 1941 the Los Angeles Department of Water and Power (DWP) extended an aqueduct from the city all the way to the Mono Basin. Dams and diversion units were installed at four of Mono Lake's five main feeder streams, catching the fresh water before it entered the lake and sending it to L.A. by gravity. In 1970 a second aqueduct was completed to capture even more water.

Deprived of most of its inflow, Mono Lake began to drop immediately, falling an average of 18 inches every year. "By 1981," Emilie told us, "the lake had dropped 46 vertical feet. Its volume had been halved and its salinity doubled. Negit, the island where most of the gulls used to nest, was no longer an island—a land bridge had been exposed between it and the mainland, and predators, especially coyotes, had invaded and destroyed the gull colony. The spring season brine shrimp population had nearly vanished, probably because of the increased salinity, depriving the birds of food. And thousands of acres of alkaline lake bottom had been laid bare. On gusty days the wind stirred up dust clouds that billowed for miles, creating a health hazard for anything that breathed."

Ironically, L.A. didn't really need Mono Basin water. The amount of water siphoned from the basin each year represented only about 14 percent of the city's total water use, a volume that easily could have been obtained from sources less devastating to the environment or, better yet, could have been saved by simple water conservation measures. The problem was, nobody was pointing out these facts, either to DWP or to the public. That is, not until Dave Gaines and a handful of friends appeared on the scene.

"Dave received his M.S. in ecology from the University of California at Davis in 1973," Lauren explained. "For a couple of years after that he taught

JUDY BURRILL

Among the birds that depend on Mono Lake are Wilson's phalaropes (right). If diversions of water from the Mono Basin are not curtailed, these and other migrating birds will have no place to feed. Nearby Owens Lake was drained completely by 1928 and is now a wasteland of toxic alkali dust (above).

college, worked as a biological consultant, and conducted endangered species research. In 1975 his consulting work brought him to the eastern Sierra and Mono Lake. He fell in love with the lake, its birdlife and landscape. But he was alarmed by the DWP's water diversions—the lake was drying up quickly, yet little was known about its biology and the consequences of the falling water levels."

In 1976 Dave helped a group of undergraduates from the University of California at Davis to conduct a three-month study of Mono Lake with grant money from the National Science Foundation. That study produced the first quantitative data on the number of birds using the lake and the potential ill effects of further water diversions.

By 1978 Dave had moved away from the Mono Basin but was still visiting regularly to watch birds and visit friends, many of whom were now graduate students continuing to study the basin's biology. It was clear that the lake level was getting seriously low, and that the diversion process needed to be slowed before the lake was reduced to an alkaline sump. Dave had already made a small reputation as an environmental crusader, and one night at dinner some friends, notably Dave Winkler—then a graduate student at the University of California at Berkeley and now an assistant professor at Cornell—suggested to Dave that he spearhead an organization to publicize the lake's plight. Reluctantly he agreed, with the understanding that others would help out as much as possible.

Thus the Mono Lake Committee was formed. At first its "staff" comprised Dave Gaines, his wife Sally, and Dave Winkler, who began their effort by traveling tirelessly up and down the state, presenting slide shows to Audubon and Sierra Club groups, describing the wondrous lake and its predicament and pleading for funds to lead a fight to save it. From the start Dave Gaines's eloquence and charisma charmed audiences, and supporters from all over California began joining the committee by sending contributions.

That first year Dave and Sally moved to a tiny house in Lee Vining where Sally and the children still live today. From that home base, Dave worked ceaselessly in the lake's behalf until his death. His devotion to the lake took him from conference meetings to the halls of Congress. Under his guidance, the Mono Lake Committee helped to create the Mono Lake Tufa State Reserve in 1981 and the Mono Basin National Forest Scenic Area in 1984, and helped to initiate state and federal studies of the lake's unique ecosystem. The committee grew to nearly 12,000 members with 16 staff and interns and established a visitor center in Lee Vining. And through educational programs, tours, and an informative newsletter—edited by Dave—Mono Lake became a household word throughout California.

The concerns of the Mono Lake Committee, whose members have been labeled by detractors as a bunch of eco-freaks, are not idle musings or speculation. The dangers of dropping water levels are corroborated by the National Academy of Sciences, an autonomous organization that examines critical questions of science and technology for the federal government and reports on matters of public concern. In 1987 the academy released a study by an august panel of 11 scientists—plant and animal biologists, hydrologists, ecologists, weather specialists, and chemists—who concluded that if the level of the water dropped much farther the lake could be destroyed. According to the report, uncurtailed diversion of water from Mono Lake's feeder streams would likely result in "drastic population reductions" of aquatic organisms and "acute . . . adverse effects" on birds. A similar conclusion was echoed in 1988 by another study, this one by the Community and Organization Research Institute, a nonprofit group associated with the University of California at Santa Barbara.

Yet DWP assistant manager Duane Georgeson maintains that the reports show that Mono Lake's ecosystem is in no immediate danger and that there is adequate time to conduct additional research. In fact, DWP has said it will not curtail water diversions unless ordered by the courts, no matter how conclusive the studies or how obvious the harm. The reason, says DWP, is cost. The agency claims that water piped in from other sources would be expensive, and points out that the water flowing down the aqueduct supplies a small amount of hydropower, about 1 percent of L.A.'s energy consumption, that also would need to be replaced.

In 1987 the academy released a study by an august panel of plant and animal biologists, hydrologists, ecologists, weather specialists, and chemists who concluded that if the water level dropped much farther the lake could be destroyed.

An interagency task force, however, chaired by the California Department of Water Resources way back in 1979, felt that L.A. residents would not be inconvenienced by reduced water flow from the Mono Basin. The task force developed a plan, one that would still work today, which would not end water diversions completely but would retard the outflow, raising the lake level high enough to keep alive the brine shrimp and flies, to maintain water around Negit Island, and to alleviate dust storms. The plan would cost each L.A. resident about 74 cents each year—less than 2 cents a week!

Through this plan city dwellers would reduce their water consumption by conservation—using flush-reducing toilets, low-flow shower heads, and brooms rather than hoses to clean off driveways. Also, L.A. would be required to reclaim waste water for use in irrigation, industry, and groundwater recharge instead of allowing the water to flow uselessly out to sea.

There's no question that the task force plan would work. In 1976–77, Californians weathered the worst drought in the state's history. People had to conserve water, and they did, saving far more than would be needed to save Mono Lake. No lawns withered and no swimming pools were drained, yet DWP has stifled the plan and refuses to compromise.

Is there hope for Mono Lake? Yes, because the Mono Lake Committee, along with the National Audubon Society, the Sierra Club, California Trout, and many other groups, has taken the fight to the courts. So far they have chalked up three victories. In 1983 the California Supreme Court rose to the lake's defense with a landmark decision obligating the state to protect, as far as feasible, the lake's aesthetic, recreational, and ecological values. This case has been delayed by appeals, however, so that it has not yet resulted in any changes in diversions. More helpful to the lake's immediate needs: in 1985 a preliminary injunction forced DWP to release enough water down one feeder stream, Rush Creek, to keep alive fish and other wildlife, including bald eagles, until the case comes to trial. And in 1987, a similar injunction was handed down for Lee Vining Creek.

Sitting on the dune, listening to Emilie and Lauren and gazing off at the fissures in the Sierra Nevada that represent dying streams, I suddenly realized that the wind was picking up, sending cold blasts through my down vest. "Let's go," said Emilie. "Let's take a closer look at the lake."

Heading around Mono's north shore, we turned onto another dirt road, drove a few hundred yards, then got out and started hiking toward the water. Soon our boots were crunching on crusted white al-

GARY R. ZAHM

kali that once, not so long ago, was under Mono's waters. In the distance a golden eagle soared over some tufa towers. On and on we crunched, kicking up white puffs of caustic dust. Seen from the air, the crust on which we walked would look like a half-mile wide bathtub ring around Mono's shore. After a few minutes the dry crust gave way to wet mud. We slogged through it for a while, then gave up and stood watching the wind kick up dust clouds near Negit Island.

COURTESY MONO LAKE COMMITTEE

The late Dave Gaines, founder and mentor of the Mono Lake Committee, resting in the lake he fought so hard to save.

At present diversion rates the water level in Mono Lake is projected to drop another 50 feet before it stabilizes at about one-third of its natural surface area and less than one-fifth of its natural volume. The land bridge to Negit Island would then be permanent and the water would be too salty to support life.

But that couldn't happen, could it? Would DWP really kill the lake?

It's happened before. Just 100 miles south of Mono Lake lies the dry bed of former Owens Lake, 100 square miles of white alkali where, early this century, steamships plied the desert waters. This lake was emptied by the L.A. aqueduct system in 1928, and the day that Judy and I left Mono Lake and headed south to Death Valley we drove past Owens, where not a drop of water was to be seen. The wind raged across the road as it often does there, whipping up toxic dust that obscured our view and pelted our car like rain. Although we drove with windows and vents shut, I began wheezing. The dust, hazardous even to the strongest lungs, made the setting sun glow red over the mountains like a scene from a nuclear nightmare. And Mono's dust contains 10 times the sulfates of Owens's dust, as well as other substances suspected to be harmful to plants, animals, and humans.

Back at Mono Lake, as we headed toward town for some rest and dinner, I asked Lauren and Emilie to tell me more about Dave. "He was unbelievably energetic," Lauren said. "Despite all the work he did for the lake, he still found time to pursue other interests. He and Sally started a family as well as a small publishing business that has produced many regional history and natural history books, including a few that Dave wrote. He also taught classes in ornithology and natural and cultural history each summer. He spent days hiking, canoeing, and birding with his family, friends, and visitors. And he played lots of music. He was almost never without his mandolin."

I asked her how Dave's death would affect the committee and the fight. "Fortunately," she said, "Dave had backed off a little from Mono Lake activities in the past couple of years and had been training others to do many of his old jobs. Still, his death put a strain on us. He was a real synthesizer—he could see patterns in chaos, which was very helpful at meetings. Right after he died, our meetings lacked cohesion. He was our focal point, the one person who knew everything about everything that had to do with the lake. Now we have to see our own visions—but we are back on our feet and moving forward again."

Later that night, sitting by the wood stove in Lauren's living room, I was shuffling through a pile of old Mono Lake Newsletters and scribbling notes. Suddenly I came upon something Dave had written which showed his understanding of the complexities of life and his compassion for fellow humans. As Lauren had told me, Dave really wanted to find a compromise for Mono Lake where all concerned got what they wanted.

"I hear people say," Dave had written, "that Los Angeles is the enemy—a greedy metropolis bent on drying up Mono Lake to build more shopping centers. Such generalities are fallacious. . . . Los Angeles is not a disembodied juggernaut, but a diverse community of millions of people. . . . More and more Angelenos are embracing Mono Lake. . . . Our state's largest and most powerful city may yet choose to respect the beauty and ecological well-being of a distant watershed. Los Angeles may lead the country toward an urban future in harmony and balance with the rest of the planet."

I never met David Gaines but I miss him anyway. May a living lake be his eternal monument.

—Richard E. Bonney, Jr.

In May 1988 California's Third District Court of Appeals ruled that the licenses held by the DWP to divert water from the Mono Basin are illegal. The decision requires the state to revoke DWP's licenses and re-issue them in compliance with state law. This means that L.A.'s water exports must be reduced to maintain flows for fish populations in the four streams that DWP diverts. The amount of water that will be released into Mono Lake should represent nearly 70 percent of the water needed for the lake to remain healthy.

For more information about Mono Lake contact the Mono Lake Committee, P.O. Box 29, Lee Vining, California 93541. (619) 647-6595.

ARTHUR MORRIS

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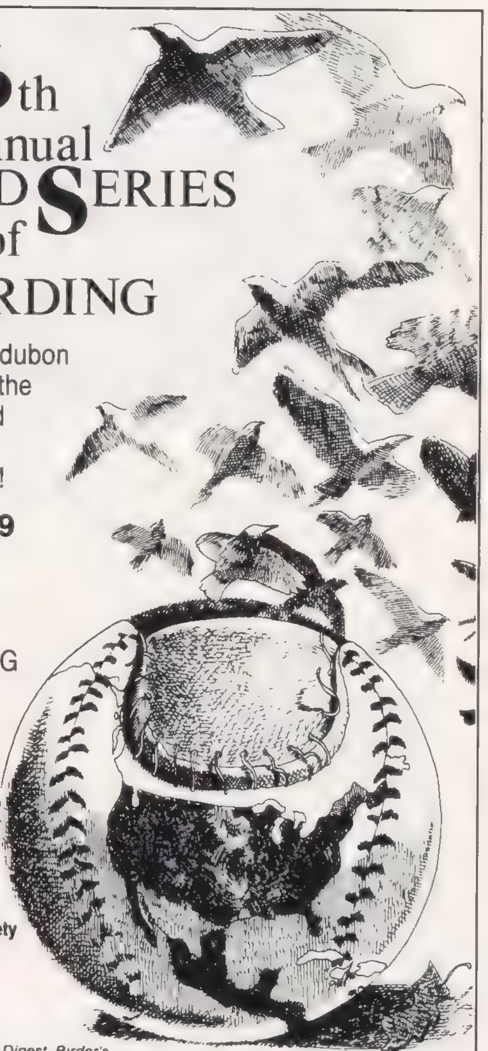

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THE LIVING BIRD *Quarterly*

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Front Cover: A brown pelican on Sanibel Island, Florida. In the 1960s, the species' population fell dramatically due to pesticide contamination, but has since recovered in Florida and some other locations. Photograph by Robert Villani. Our thanks for support in printing our front cover to Dan Gibson Productions (producer of the "Solitudes" recorded series).
Back Cover: The back of the Birdhouse Saloon, 10 miles east of Anchorage, Alaska. Photograph by Dan Polin.
Right: An area cleared on the Platte River to create crane habitat. Photograph by John Sidle.

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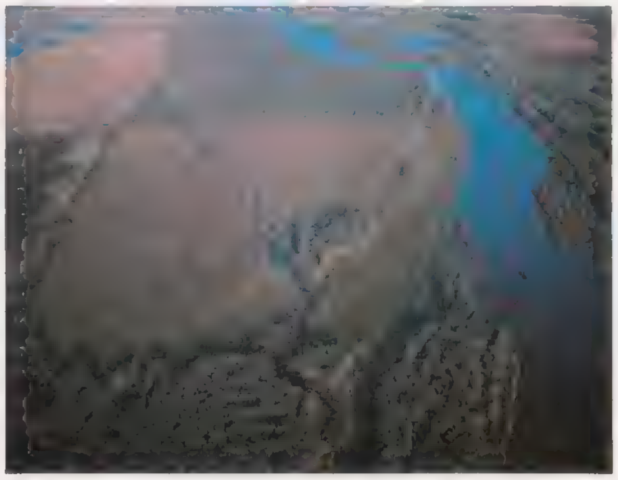

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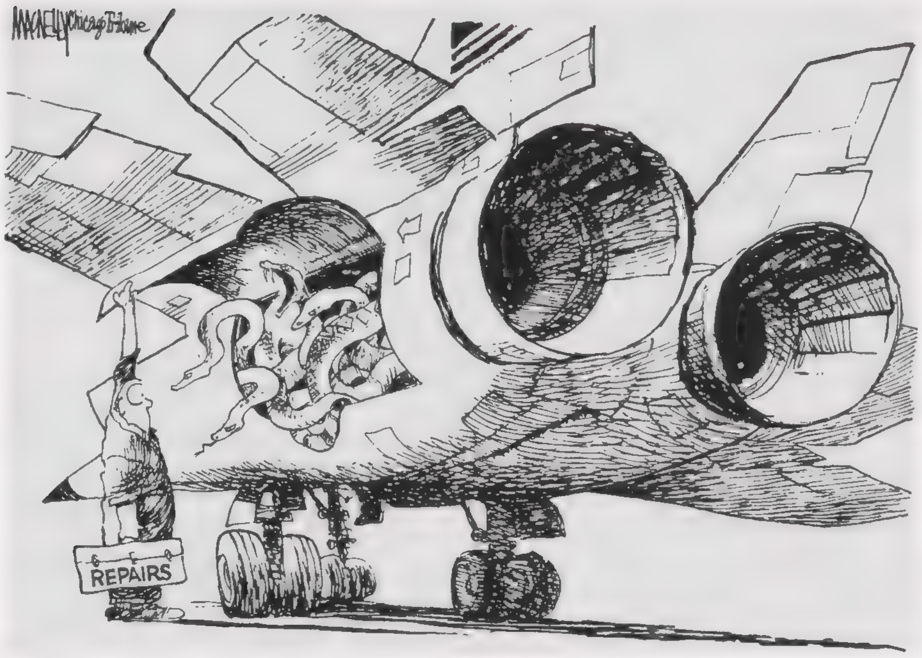

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Help may be at hand for the Guam rail, a species of flightless bird that has been extirpated on its native island by the predatory brown tree snake. In July, 30 captive-bred Guam rails will be released on Rota, an island in the Marianas chain just 70 miles north of Guam. Rota offers suitable habitat for the rails and is free of the predatory snakes. The Guam Division of Aquatic and Wildlife Resources (GDAWR) is optimistic that the rails will thrive there.

Guam, a U.S. territory in the western Pacific, was free of the brown tree snake until military ships returning from the Solomon Islands and Papua New Guinea regions after World War II inadvertently deposited the stowaway snakes onto the island. Today, it is home to an estimated three million brown tree snakes. Cruising the forests at night, they eat sleeping birds and their eggs; in the past 10 years, the snakes have caused the extinction on Guam of eight species of forest birds, including the Guam rail ("Death on an Island," Winter 1987).

In an attempt to save them from extirpation, 19 wild rails were placed in captive breeding programs in 1984 through the joint effort of the GDAWR, the Philadelphia Zoo, the Bronx Zoo, and the National Zoo. Today, more than 100 Guam rails inhabit zoo breeding facilities. Thirty of the birds will be released on Rota.

The Guam rail may gain a foothold on Rota, but can it be re-established on snake-infested Guam? Only if the number of snakes there can be reduced and controlled. In 1988 the U.S. Congress recognized this problem as critical and authorized $100,000 for research to control the brown tree snake on Guam and to keep it from spreading to other Pacific islands.

Dr. Thomas Fritts, a herpetologist with the U.S. Fish and Wildlife Service (USFWS), has been charged with developing snake control techniques. Removing hordes of snakes from dense forest and scrubland might seem like an intimidating and odious task, but Fritts and his team of ecologists, behaviorists, and physiologists are undaunted. From studies of captive snakes and observations in the wild, the researchers hope to develop substances similar to the pheromones females secrete to attract males, and use them to lure snakes into traps. They'll also evaluate the use of diseases and predators to reduce the brown tree snake population.

Meanwhile the havoc wreaked by the snakes on Guam's native bird populations is viewed with alarm by the island's neighbors. Fritts has compiled an ominous record of brown tree snakes stowing away on cargo ships and airplanes to Hawaii and to other nations. The governor of Saipan, an island in the Marianas chain north of Guam, has sent a letter to the Guam naval commander expressing concern that the snake would be transported to Saipan in cargo during military construction. The governor feels that the U.S. government is responsible for the legal, economic, and ecological consequences of accidental introductions of exotic species from its territories to other nations.

Regardless of who is responsible, the U.S. military has already acted to develop snake containment protocols, including surveying all cargo leaving Guam; in this respect it is ahead of many civilian carriers. One of the military's concerns is that its activities in the Pacific could be impeded by fear of the brown tree snake.

Never before has a reptile caused an ecological catastrophe of this scope, and existing snake control technology is largely untested. For now, the military is inspecting cargo, the USFWS is conducting research, and a public education program is in place. A problem that took 30 years to develop cannot be solved overnight, but if the snake population can be reduced, perhaps the rails can return from exile and some ecological balance can be restored on Guam.

—*Mark J. Rauzon*

A tape recording simulating the sounds of an extra-large colony of breeding dark-rumped petrels will resonate across a thickly vegetated volcano in the Galápagos Islands this summer. The playback technique is part of a program, headed by National Audubon Society researchers Stephen Kress and Richard Podolsky, to attract the endangered seabirds to nesting sites protected from predators.

Dark-rumped petrels were once abundant in the Galápagos and Hawaiian islands, but domestic animals brought by human settlers to both island chains have decimated populations of the crow-sized, gray, black, and white bird. During the eight- to nine-month breeding period each year, the petrel nests underground in natural cavities and excavated burrows, making the eggs, young, and adults easy prey for dogs, cats, pigs, and rats.

Kress and Podolsky are old hands at seabird restoration; they have successfully used natural sound recordings to attract puffins, terns, and Leach's storm-petrels to islands off the coast of Maine.

Last summer they conducted a preliminary study on Santa Cruz Island using a recording of dark-rumped petrels provided by the Cornell Laboratory of Ornithology's Library of Natural Sounds. This recording, simulating the sounds of a large breeding colony, attracted petrels to hand-dug burrows in the crater of Mirador, an extinct cinder cone volcano.

This summer, after Galápagos National Park officials launch an intensive rat-poisoning program, and fence off Mirador Crater to exclude pigs and dogs, Kress and Podolsky will use recordings to encourage petrels to breed in the predator-free area.

The petrel restoration program is an example of how natural sound recordings can further the study of animal behavior and aid in wildlife conservation.

Chewing Away

A gigantic voice comes barreling out of the receiver. "Hello," it says, stern, wry, emphatic, gigantic, barreling. "Mike Harwood here."

We all sit up a bit straighter. We knew he was going to call. We had asked him to furnish the final changes in the copy for his quarterly column, but the image of those writerly lips pressing against the mouthpiece still causes the needle on our internal seismograph to quiver from zero to two.

"I don't like the deletion of the comma in the first sentence," he declares, the faintest taint of pedagogy coloring his tones.

And we're off and running.

Show us a man with a powerful persona and a passion for comma placement, and we'll show you the author of The View from Hawk Mountain, The View from Great Gull, *and the winner (with his wife, Mary Durant) of the prestigious Burroughs Award for* On the Road with John James Audubon. *We ironed out our differences over each jot and tittle, then turned on the tape recorder and asked Contributing Editor Harwood to spin out his thoughts about birds and mankind.*

My father was a physician and a birder, and one of my uncles was a real hotshot bird watcher. When I was little they took me birding, but at 15 I went away to boarding school, and without my father as a guide I didn't go birding on my own. It was his hobby, not mine.

But 10 years later, like a stroke of lightning, the interest caught up with me. It was rather miraculous. I was sitting in a car on a Long Island beach, looking out at the water on a late fall day. Sea ducks were streaming along the horizon and I said to myself, I wonder what those are. That's the first question, the telltale sign you're becoming a birder. I telephoned my father and said I don't suppose you have an extra pair of binoculars. He was absolutely delighted to give me a pair. He sent them and a field guide within a few days, and I was off.

In no time I became an addict. A college classmate—you know him as the Professor—who I hadn't been aware until then was a birder, buddied around with me in those days. Both of us were going through divorces and we birded a lot together and egged each other on.

He lived near Columbia University, and some nights we would stay up until midnight playing cribbage, and then one of us would say, "Hey, let's go to Jamaica Bay." So, after a few more games of cribbage, at two o'clock in the morning we'd put our telescopes over our shoulders and binoculars around our necks and go down into the New York City subway system and ride for two hours to the Jamaica Bay Wildlife Refuge near Kennedy Airport. We made that kind of loony expedition all the time. I birded hard in and around New York City, taking weekend trips within a day's drive, and bird watching in Central Park. Through this exposure I became increasingly aware of what was happening to the environment. Were we headed for disaster? I wondered. What were the signs? What would turn things around? I became so absorbed that I switched the focus of my writing from popular history to natural history and the environment, and of course to birds.

The first thing I did was to build a large library. I was delighted by the neat stuff people had discovered about birds. For example, big owls, particularly the great horned, nest early, so that later in spring and summer, when the young owls are at their hungriest, there are lots of prey animals just being born—easy pickings for the parent owls and for the young as soon as they fledge. That kind of thing really caught my fancy.

JOHN R. WHITE

"REWRITE!" 1957's archetypal newspaperman, Harwood churns out copy for the Middletown, New York, Times-Herald.

The turning point in my career came with the publication of *The View from Hawk Mountain* in 1973. Researching the book involved me in issues I had only read about before, in particular, the effects of pesticides on birds. I visualized developing a series of books on the theme of man's relationship to the planet. I followed up on that idea in *The View from Great Gull* in 1976, and the same idea is the basis of the one that I'm working on now, which focuses on the Mississippi watershed.

As a result of my research and writing, I have seen that we are an increasingly mechanized society, an able species with longer and longer lifespans and rapidly growing populations, and that we are doing great damage to the environment. We are not a benign influence. We invent products that improve our lives now—for example, herbicides and pesticides—but we don't consider their future effects on the environment or on society as a whole; the attitude is full steam ahead, damn the torpedoes. We do great damage that could have been avoided, and the more sophisticated our technology becomes, the more damage we are capable of doing. We're chewing away our life support system. At all levels individuals must make a much greater commitment to life on the planet.

There's nothing new in what I'm saying; this has been the thrust of the environmental movement for 20 years. Our point of view is given more credence now by the establishment and by the public than it was 20 years ago, but the change is not enough to have halted our destructive inertia.

And with that we pause and reflect and somehow disagreements about comma placement don't seem very important.

—Jill Crane

Birding for Dollars

This will be the 10th consecutive spring the Professor and I have engaged in our justly famous weekend birdathon, with which we help to raise money for the Great Gull Island Project, an ornithological research station on Long Island Sound. More and more birders these days, it seems, take part in birdathons. In fact, I'll bet there isn't a conservation-minded North American who doesn't receive at least one birdathon solicitation each year from birders who are fundraising for some conservation cause or other.

"We're going birding for a day at the peak of the spring migration," announces the typical solicitation letter; usually the "we" is a bunch of hotshot birders representing some deserving bird-oriented organization. So far this merely describes a common birding event, the Big Day (sometimes known as the Grim Grind or Century Run), the purpose of which is to compile the longest possible list of species seen or heard in a 24-hour period. The Professor and I double the Big Day into a Big Weekend.

The letter then continues more or less as follows: "We will use this event to raise money for our deserving bird-oriented organization, and to do that we need *your* help. Please sponsor us for a certain amount of money per species"—usually the amount is left to the solicitee's discretion—"and after our bird trip is over we will let you know how many kinds of birds we saw or heard and how much you owe us." Presto! A Big Day is turned into a birdathon—a fundraiser.

The proposition of course assumes that the sponsor has faith in the veracity and expertise of the birdathoners. *Some* faith anyway. One of our sponsors, no birder himself, put himself completely at our mercy, writing at the bottom of his pledge: "Note: Certification by a Certified Public Accountant as to the accuracy of the final determination is hereby waived."

On the other hand, a couple of years ago another sponsor reacted with shock at our list of 160 species compiled over a May weekend in Connecticut: "Something's not twite right here," he expostulated in a shower of bird puns. "What kind of a ruff deal is this? You must think I'm gullible to swallow all that bushtit about your seeing 160 birds. It's a pitta you don't show enough data to macaw that list of species believable. Eider that or you should parrot down a little. I egret now that I pledged 25 cents/bird instead of just offering you a swift kick in the rhea. Stilts my responsibility to pay, and since I gannet get out of it I won't grouse about it ani moa even though you coot easily be robin me. So you'll find heron my check for $40."

Despite such reasonable doubts, a birdathon is apparently a reliable way to raise money. A lot of groups try it. My friend the Older Author says she is annually importuned by so many birdathoners she has finally decided not to succumb to a single such plea ever again. Which is hard on me, because she was a fixture on my own birdathon solicitation list.

The 10-year run of our particular birdathon includes two years when the Professor wasn't in this country but in Japan. We made a virtue of that minor inconvenience by conducting a Far-flung Birdathon each of those years. The Professor counted birds in Japan the same weekend that I and other friends counted birds in Connecticut, and we combined our two lists. We've had ruffed grouse and bamboo partridge, hairy woodpecker and Japanese pygmy woodpecker, rough-winged swallow and red-rumped swallow, American goldfinch and oriental greenfinch all on the same tally sheet.

A male chauvinist sponsor agreed to pay 20 cents a species for males and one cent a species for females.

Doing the count in Connecticut and Japan on the same two days greatly enhances the sporting quality of the event for our sponsors, because weather can wreck or reward our best-laid plans in two places, not just one. Our combined total of species can range from 150 to 220. At a quarter a species, say, that difference is meaningful.

Some of our sponsors are more sporting-minded than others. One of them gives a bonus for each species found having a certain color in its plumage. So far he's featured red one year, blue the next. Another, obviously a male chauvinist, agreed last year to pay off at 20 cents a species for males and one cent a species for females. But my favorite sponsor, the Prince of the Sports, always comes up with a real test for us. He pledges a generous amount—e.g., one dollar a species—up to a certain plateau, then ups the ante in one or more steps to a plateau that will be a challenge for us to reach. To spur us on he also extracts a severe penalty—e.g., five dollars—for each species we fall short of that total.

When the Professor and I proposed our first Far-flung Birdathon, the Prince of the Sports added a bonus to his formula. He would pay $40 for every species that showed up on both lists. He made this offer, he told me later, under the impression that the possibilities were extremely limited. He is a globe-trotting birder himself and should have known better. *I* knew better. The Professor had sent me a Japanese field guide, and though it was printed mostly in Japanese—a language I read and speak with the same fluency I do Urdu and Sanskrit—it did include the English and scientific names in an alphabet I could comprehend. Japan and the northeastern United States have a lot of birds in common.

I leafed through the guide and found more than 60 species—particularly raptors and water birds—that I thought, given the season, we might both see. As it turned out, the Professor's weekend list of 48

species included eight that were also on my Connecticut count of 142: green-backed heron, cattle egret, black-crowned night-heron, mallard, ring-necked pheasant, dunlin, rock dove, and barn swallow. That was even better than we had anticipated—or wanted: We were afraid that if we told the Prince of Sports about his costly error he might never sponsor us again. But he did. When we announced our second Far-flung Birdathon he merely eliminated all rewards for duplicates and added the proviso that if we didn't find at least eight duplicates, the shortfall would cost us.

The Professor and I have been going on Big Days and Big Weekends together for 20 springs at least—birding for 24 or 48 consecutive hours in mid-May (sometimes with stops for long naps), chasing big lists of birds seen and heard. Some years we have gone all-out for high numbers of species and have driven hundreds of miles to sample the widest possible range of habitats. Other times we've limited the parameters by committing ourselves to on-foot Big Days and all-inland Big Days, and we've talked about doing an entire Big Day from a canoe.

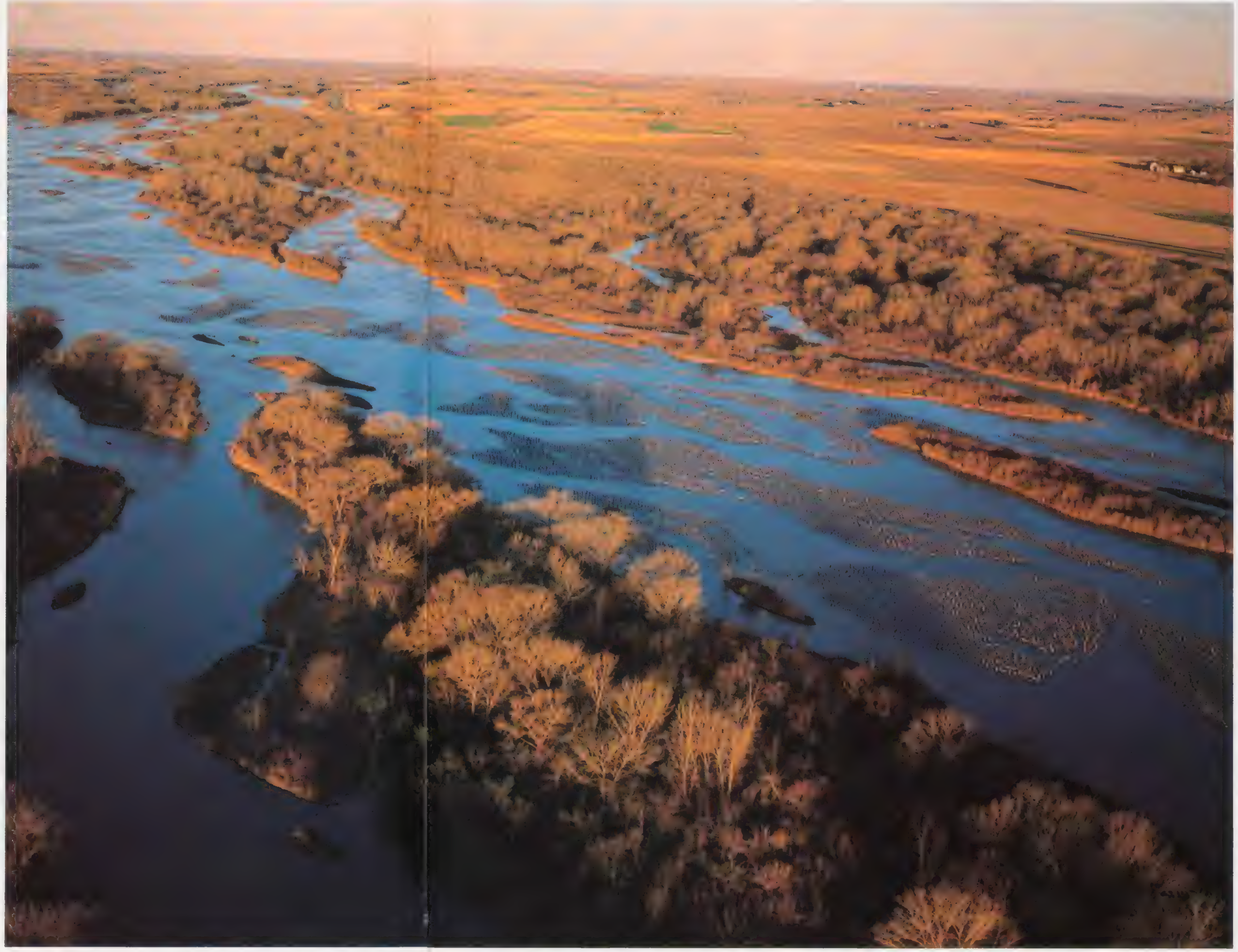
Big Days and Big Weekends are always challenging and exciting, whatever private rules we set for them. But our birdathoning has added an extra dimension to them. For example, we occasionally camp in a favorite overgrown field, where I wake shortly after midnight, our official starting time, to hear the first species for the list—barred owls whooping and yelling nearby, an ovenbird singing its long, complex, ethereal night song. I lie there in my sleeping bag, grinning into the darkness, and not just because of the astonishing, inscrutable voices of my co-planetarians. I hear inside my head at the same time an imaginary cash register ringing up money —barred owl, CLANG, ovenbird, CLANG— for the benefit of bird research and conservation.

—Michael Harwood

A PRAIRIE RIVER ROOST

John G. Sidle

JOHN SIDLE



Left, dawn in Nebraska: from the sky I photograph sandhill cranes roosting along the Platte. I notice that the shape of the flock resembles the shallowly submerged sandbars on which the birds stand. If the river's flow dropped substantially, the bars would emerge and sprout trees, further reducing roosting habitat. Far left, sandhills consume over 1,500 tons of waste corn during their spring stopover en route from Texas and other southerly wintering areas to their arctic nesting grounds.

DARRELL GULIN

Late one winter morning I stand on the western tip of Mormon Island in the Platte River, Nebraska. Thousands of migrating sandhill cranes fly overhead to feed in the wetland meadows in the center of the island. It's an exciting time. On weekends, tourists and local residents line the roads to observe the cranes feeding and performing courtship dances in last year's cornfields. During migration, over 400,000 sandhill cranes—80 percent of the world's population—feed and roost along the Platte River for several weeks.

The Platte is a crane way station, an important and traditional stopover where the birds take on the vital fat and energy reserves they will need for later reproduction in the far north. In early spring melting snows reveal waste corn, and the meadows come alive with insects, worms, snails, and other invertebrates that cranes like to eat. The waves of sandhill cranes arriving at Mormon Island from wintering areas along the Texas coast, in Mexico, and in the Southwest are one of the biggest avian spectacles in the world.

By international treaty the U.S. Fish and Wildlife Service is responsible for protecting migratory birds, including these sandhill cranes. The Platte has been a focal point for conservation by USFWS and private conservation organizations for over 20 years because it is used heavily by the cranes and by millions of waterfowl and other birds that funnel through the 90 miles of the Platte called Big Bend Reach. As a biologist and pilot with the USFWS, I devote my time to the conservation of Platte River birds and their habitats such as Mormon Island.

Covering most of Mormon Island is the Crane Meadows Sanctuary, which is owned by the Platte River Whooping Crane Critical Habitat Maintenance Trust, a private conservation organization. Based in Grand Island, Nebraska, its mission is to restore and manage migratory bird habitat in the Big Bend Reach.

Mormon Island splits the Platte into two channels. One, narrow and wooded, is less attractive to cranes and other migratory birds. The other, wide and open, is more like the Platte's historic aspect of treeless sandbars and extensive wetland meadows, the habitat that sandhill cranes must have to survive.

Sandhill cranes require a wide, shallow channel for their nocturnal roost. This provides extensive visibility for the security-conscious birds, which gather into groups of up to 20,000. A forested river valley does not afford such security. The birds also depend upon wetland meadows for their invertebrate food and as a place to perform their courtship displays and form pair bonds. Historically, the river's flow maintained a wide channel by scouring away any vegetation that got a foothold and by sustaining wetland meadows.

During the past 100 years, however, the flows in this reach of the Platte have diminished because water has been diverted for agricultural irrigation and power generation. Canals and reservoirs abound throughout the Platte River system, whose waters flow from the Rocky Mountains of Colorado to the North Platte River in Wyoming and the South Platte River in Colorado, to converge in western Nebraska.

About 90 major canals have been constructed in Nebraska, and 16 dams impound water throughout the Platte River system, so that 70 percent of the river flow is now diverted and consumed before it reaches the Big Bend crane roost. The result has been the gradual growth of an extensive forest along the river bank, and sandhill cranes have abandoned over 60 miles of river because channel width has shrunk from 2,000 to 100 yards.

The Platte River Whooping Crane Trust plays a major role in preserving crane habitat in the Big Bend Reach. The trust was founded in 1979 when Grayrocks Dam was constructed on the Laramie River, a tributary to the North Platte River in Wyoming. The dam was built to store water to cool a coal-fired power plant. The state of Nebraska and the National Wild-

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JOHN SIDLE

life Federation filed suit against the dam's sponsors, six consumer-owned utilities. The plaintiffs contended that Grayrocks would deplete the flows of water and damage downstream habitat along the 54 miles of the Big Bend Reach that had been designated by the USFWS as critical for whooping cranes.

An out-of-court settlement was reached. Grayrocks was built, but certain flows from it were guaranteed. The settlement also established wildlife as a legitimate consideration in any decisions made about management of the Platte. And, the $7.5 million Platte River Whooping Crane Trust was established for the purpose of restoring migratory bird habitat in Big Bend. Today the trust, administered by three trustees from the National Wildlife Federation, the state of Nebraska, and the Basin Electric Power Cooperative, is a prominent advocate for all Platte River wildlife.

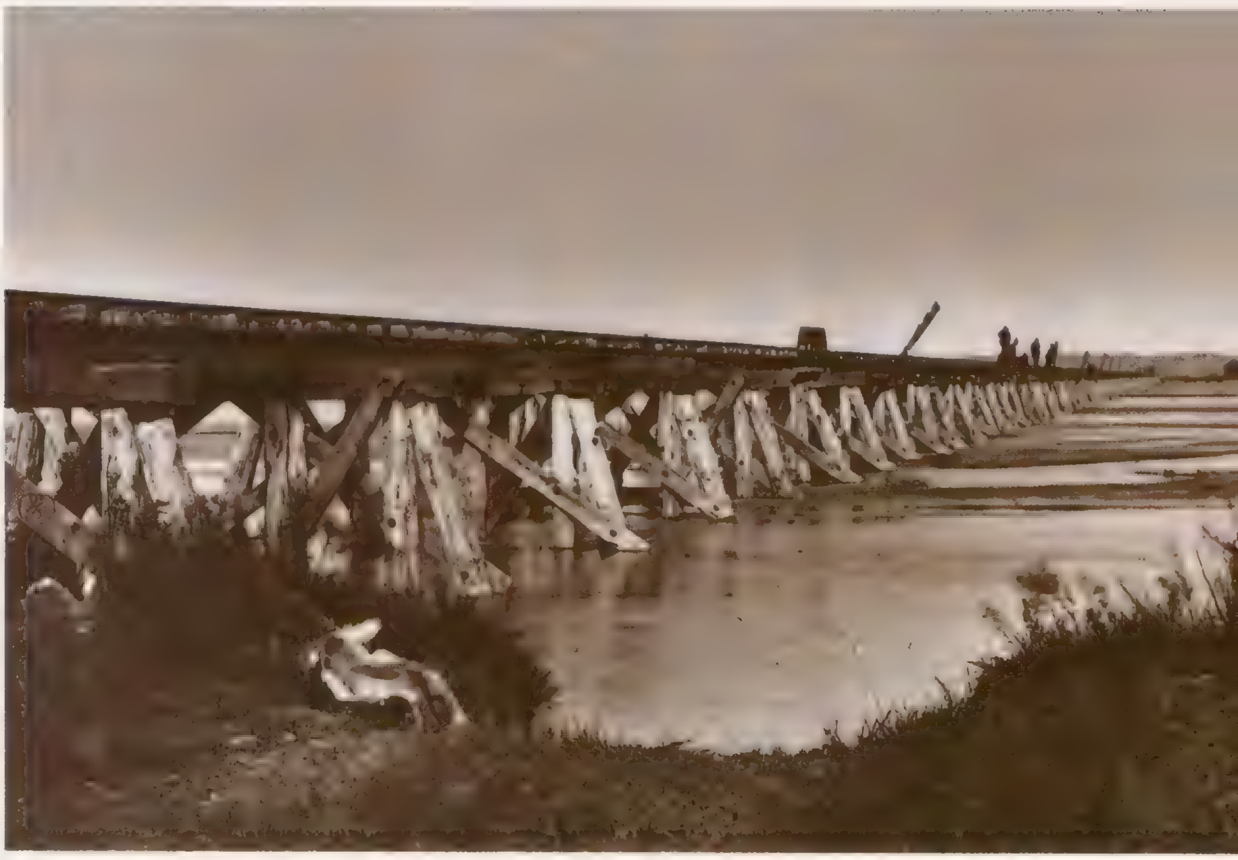
To put the pieces into perspective—the cranes, the water, the trees, and the work of the trust—I take to the air to trace the river. I maneuver my plane just south of the main channel of the sandy, shallow river adjacent to Crane Meadows. At 800 feet I am low enough to see the sandhill cranes but high enough not to disturb them. The sun is just rising and the birds reflect a silver color as I pass a roosting flock of 15,000 birds. Larger flocks are ahead of me; I cannot recall when I've ever seen such concentrations of birds.

The channel below is about 1,200 feet wide and bordered by open grassland, wetland meadow, and cropland. With extensive visibility in all directions, it is excellent roosting habitat. I look down on the brown, flowing sand in the shallows. Some cranes are leaving to forage in adjacent cornfields. Most, though, are standing on shallowly submerged sandbars surrounded by a mosaic of deep water. By the river's edge, vehicles parked along a trail signal occupancy of the trust's blind, constructed to allow visitors to observe cranes roosting at dawn and dusk.

Flying along the Platte River is most revealing. It's the biggest stretch of wildlife habitat in central Nebraska, yet it has long been a focus of human activity. Indians marked it in their travels.

My flight along the Platte parallels the old Oregon Trail and the Pony Express route. Railroads, and later, highways, also followed the course of the Platte. European settlers chronicled the Platte as "a mile wide and an inch deep, too thick to drink and too thin to plow." They described the Platte as nearly treeless and remarked about the difficulty of finding firewood. Today, trees border much of the Platte and populate most of its islands.

The Platte is an unusual river. It is called a braided stream because its annual floods create flows that are much greater than those during the rest of the year and, when they recede, leave behind many interlaced channels. Also, the river's sediment is loose sand and gravel, and the valley slope is sharp and steep. Once the river was able to transport tremendous quantities of sand and gravel. From the airplane, I can still see the bottom shifting, although much less than I would have seen 50 years ago. Just below the water's surface, clouds of brown sand and gravel drift off submerged sandbars and flow downstream. Historically it was the steady water flow, the constant reworking of sediments, that kept the main channel open, carved new channels, and formed numerous sandbars and other shallow habitats for roosting and breeding birds. But now reservoirs and canals throughout the Platte system trap sediment and intercept most of the flow.



Left, flying above the Platte, I can instantly grasp the tremendous changes that have occurred along the river. A hundred years ago the banks supported virtually no trees. Above, bridge over the North Platte, near its intersection with the South Platte. Today's bridge at this location is much shorter than the old one. Picture by frontier photographer W. H. Jackson, Lincoln County, Nebraska, 1869.

In some of the old, dry channels, trees have taken root. Because spring flows no longer scour away vegetation, cottonwood and willow seedlings have a chance to reach maturity. The once wide and open braided channel has seen a population explosion of trees; in many places the total width of water has decreased by 80 to 90 percent.

I follow the widest channel; if there are cranes they will be here. Below me are a dozen islands that the trust has cleared of trees. It may seem strange to cut down trees and pulverize brush to benefit birds, but many species prefer open habitats. Shorebirds such as least terns and piping plovers breed on barren to sparsely vegetated sandbars; upland sandpipers breed in open wetland meadows; and all kinds of migrating shorebirds pause on the open Platte.

From the air I can see few remaining stretches of river with unobstructed views for cranes. I try to imagine how the Platte looked 100 years ago. Garnett Williams of the United States Geological Survey (USGS) pulled together historical photographs from the 1870s and contrasted these with recent shots of the Platte. The 19th-century photos show long bridges crossing the Platte with not a tree in sight, whereas recent

JOHN SIDLE (2)

Wading toward solutions: To re-create open roosting habitat, the trust clears trees from the river channel, while USFWS and trust biologists measure the river's depth and width to determine if the flow can sustain crane roosting habitat.

photos of the same locations picture a narrow stream bordered by trees and traversed by short bridges. From the air I can see the 80-year-old bridge piles on dry land surrounded by trees—dramatic habitat changes within memory of the state's oldest residents.

It's easy to dwell on the Platte's habitat loss, but what is being done about it? The trust is the only organization engaged in extensive habitat management. One of the trust's more recent projects is about 55 miles west of Crane Meadows, near the Kearney diversion canal. Here the trust has cleared trees from a 400-acre area, where wild horses imported from Nevada graze on tree sprouts and shrubs to keep the area open. About 60 cranes forage in the newly formed meadows for invertebrates, important sources of protein and calcium the birds will need later for egg laying and hatching. Between the meadows and nearby cornfields, each crane will find enough food to gain three-quarters of a pound in fat reserves before departing for the arctic breeding grounds.

The trust owns 8,195 acres of habitat, and vegetation has been cleared from six miles of river. Plans are in the works to acquire 25,000 more acres in 10 habitat complexes located at eight-mile intervals in the Big Bend. At each location, the river channel would be kept 1,000 feet wide for a distance of at least a mile.

But water is needed to restore and maintain habitat. To that end the trust, the USFWS, and other organizations are using computer-generated models to develop limits on the amount of water that builders will be allowed to divert for new water projects. Of particular interest is maintaining habitats of troubled species—whooping cranes, piping plovers, and least terns, and the terns' forage fish.

But where is more water going to come from? I fly west, near Lexington, where I see a canal dumping water into the river, the return flow from a line of power stations that remove Platte water farther upstream. During the crop-growing season most of the water is diverted for irrigation. Above the canal only a weak stream trickles into the river, and a dense forest stretches 60 miles to the city of North Platte where the North and South Platte rivers converge.

I follow the North Platte for 50 miles to the Lake McConaughy Reservoir. Here is a lot of water—1.7 million acre feet—held back by the Kingsley Dam, which controls 75 percent of the flow that passes Crane Meadows 160 miles downstream.

Researchers from the trust, the USFWS, and the USGS believe that the completion of Kingsley Dam in 1941 led to profound changes in the environment of the Platte River by drastically reducing flows, permitting the growth of the present forests. Could some of this water now be used for birds?

The dam has been operating under a 50-year license from the Federal Energy Regulatory Commission. This license expired in 1987, and the trust has petitioned the commission to require the dam's operators to discharge water, not only for the benefit of irrigation and power generation, but for cranes and other wildlife as well. The commission is deliberating as biologists and hydrologists collect data on birds, habitats, and flows under the watchful eyes of lawyers.

The courts have long been involved in the Platte. Nearly 45 years ago the U.S. Supreme Court apportioned the North Platte River between Nebraska and Wyoming. Recently, the Deer Creek Dam, proposed for a North Platte tributary in Wyoming, triggered a lawsuit by Nebraska against Wyoming. Nebraska claims its water rights are being violated and would be violated further by the dam, while Wyoming feels it is not getting its fair share of water for irrigation and power.

The trust and other organizations filed a motion to require that part of the river flow be regulated to protect migratory bird habitat. Nebraska subsequently amended its suit to include the flows necessary for

THOMAS MANGELSEN

wildlife. The court has decided not to address the wildlife issue, but has appointed a special water master to tie the case together for the court to hear. That may take a while. The last court decision involving the Platte took almost 11 years.

What do Nebraskans think about wildlife conservation along the Platte? University of Nebraska researchers found that 87 percent of survey respondents would agree to protect the endangered species of birds even if it meant limiting water diverted from the rivers for agriculture.

On my return flight to Grand Island I pass south of the Big Bend Reach over agricultural lands to view the remaining wetlands of the Rainwater Basin. Over 90 percent of these wetlands have been destroyed. Geese pack the remnant ponds and sloughs. Nine million ducks and geese, including most of the continent's greater white-fronted geese, use the Platte Valley and the Rainwater Basin during migration. The USFWS is trying to acquire what is left of these wetlands, which before agricultural development stretched across dozens of Nebraska counties. Preparing to land, I spy a thousand cranes in a cornfield. The control tower cautions me about soaring cranes near the airport.

Cranes are the focal point of Platte River conservation, but other birds also depend on the river and its habitats. Back on the ground, I walk a trail along the edge of a wetland meadow. This is ideal habitat for upland sandpiper, Wilson's phalarope, sora, Virginia rail, bobolink, eastern meadowlark, dickcissel, and dabbling ducks. I spot an upland sandpiper alighting on a fencepost. I walk south toward the river across an upland grassland, home to horned lark, lark sparrow, grasshopper sparrow, western meadowlark, sharp-tailed grouse, and greater prairie-chicken.

Flocks of sandhill cranes flap slowly in the warm breezes. I feel removed from the bustle and noise of civilization although the interstate highway is only a few miles away. Dozens of tourists are arriving to watch the cranes roost from the trust's blind. The morning and evening tours have been sold out for months, a good sign of concern for the Platte.

Inside the blind, a concrete bunker buried in a hill, 20 visitors and I peer across the Platte shortly before sunset. Shallow water over the sandbars shimmers in the setting sun. Everyone becomes anxious as we hear a crescendo of crane calls from the wetland meadows a half-mile behind us. A few loudly calling cranes fly up and down the river. A hundred cranes alight in the shallows and swarms of birds rise from Crane Meadows. The prairie river roost comes alive as more and more birds join the first arrivals. We in the blind are quiet and intensely curious. The cranes, too, are alert, shifting positions for the night. In the darkness we leave the blind, content that we have witnessed this intimate moment in the lives of the birds. □

John G. Sidle is a biologist with the U.S. Fish and Wildlife Service in Grand Island, Nebraska.

Further Reading

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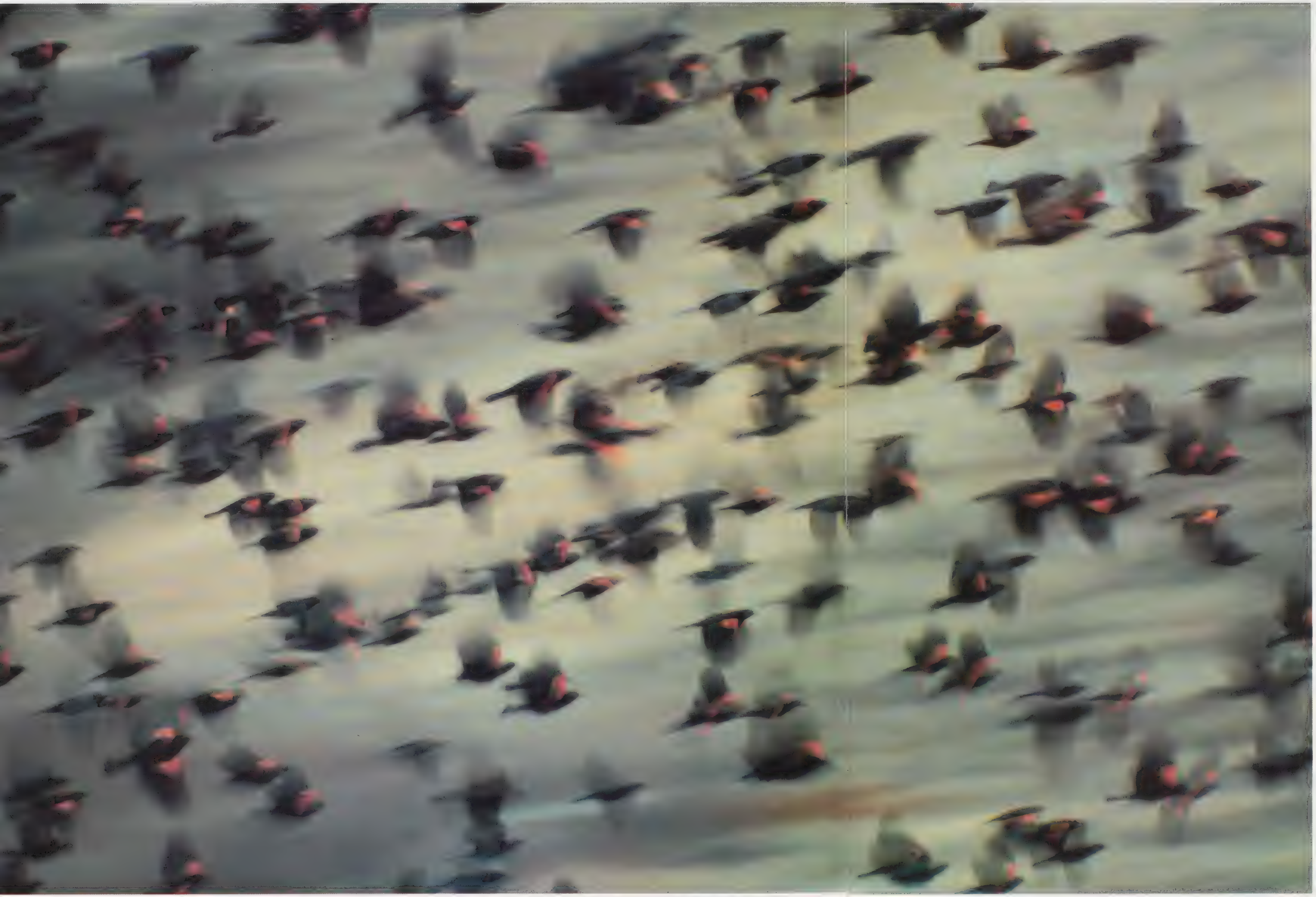


Red-winged blackbirds

Dreams in Motion

Photographs by Frans Lanting

Frans Lanting is a photographer whose work has frequently graced the pages of The Living Bird Quarterly. *You might recall his luscious closeups of feathers (Autumn 1988), or his powerful representations of the Madagascar rainforest (Spring 1988) and Laysan albatrosses (Spring 1985), or the crushed egg of a brown pelican (Winter 1989). Lanting is not only a photojournalist of the first rank, he is an experimenter, an interpreter, an artist creating worlds from his own images. In an interview with Nigel Skelsey, former editor of the British magazine* Photography, *Lanting elucidates the technique and philosophy behind his ability to capture the flow of movement in a still photograph.*

Here are some excerpts from the article in Photography *based on that interview.*

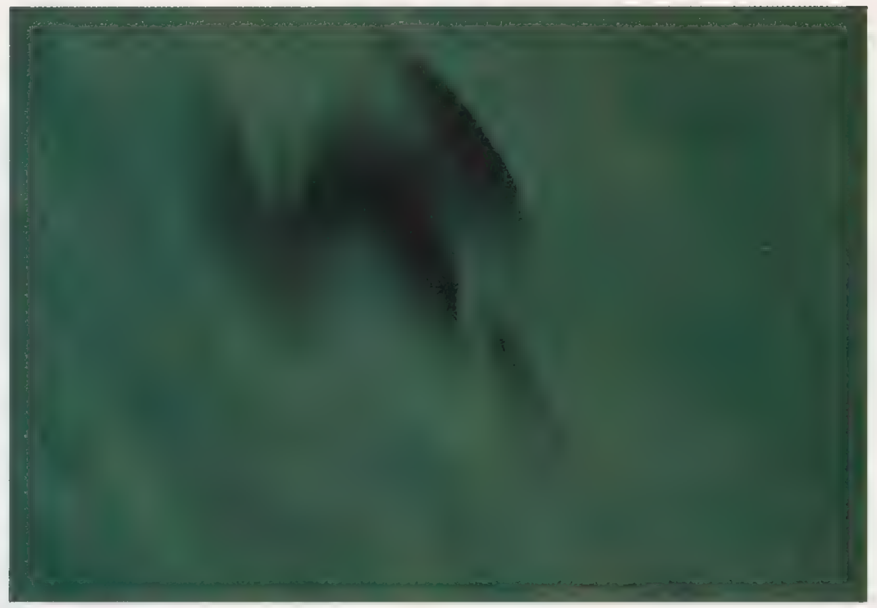
Born in Holland and now residing in Santa Cruz, California, Lanting emigrated to the United States to pursue a career in environmental studies. He rapidly became disillusioned with the bureaucracy of environmental politics, so he decided to change careers and go into photography, something he was practicing quite fanatically at the time.

From the beginning Lanting has been more concerned with artistic, impressionistic interpretations of his subjects than with factual renditions.

"The birds I photograph have more in common with archetypal birds scratched on cave walls 10,000 years ago than the kind you find in your field guides. They're more symbols—reflections of an age-old fascination people have with birds rather than the specific peculiarities of the white-throated chaffinch—and you can do things with birds that strike that chord. I like the approach where I'm dealing with the fascination that comes more from the gut than the brains.

"Birds also offer more on a visual level than, say, mammals, which tend to stand around on four legs most of the time and not do much. Birds, with their

(continued on page 18)



Brown pelican

Gull

Brown pelican

Willet

Sooty terns

Laysan albatross

Laysan albatross

White stork

Greater flamingos

color and elegant forms, their stylized behavior, and their flight, offer more potential."

The secret of people with any particular skill is that they make it all look so easy. Although Lanting is not the first photographer to take blurry bird pictures (he cites Ernst Haas as his first and foremost influence), there is more to it than meets the eye.

"There's a difference between simply setting a shutter speed at 1⁄15 of a second, and giving the speed of each shot a great deal of thought. With motion studies each bird requires a different approach, because the flight patterns differ, wing speed is different, and so on. Sometimes a bird needs to be shot from the front and at other times it is better side on.

"Through trial and error I find the right shutter speed, and I've discovered that if you pan with a flock, for instance, it's best to do it when you're perpendicular to it. If you do it any other way the registration often is uneven and the birds in front look very strange when compared with those in the middle.

"Some of these images exist as much in my mind as they do on film. Often I dream up mental sketches of images I would like to do, but which may sometimes take years before the actual conditions occur. So the concept comes first and then it's a matter of finding the right conditions."

Lanting spends most of his year in remote locations as diverse as the wastes of the arctic and the jungles of Madagascar. The reason is a wider range of picture possibilities.

"Exotic locations enable me to work at close range with birds, which in turn allows me to use different perspectives to stay with the bird rather than look at them through a 600mm lens, which limits the visual possibilities. The greatest compliment a bird can pay you is to go to sleep right in front of you. When you've grown up in Holland that's hard to conceive.

"Making a living as a photographer is not easy. The way I've managed is by producing images that look different, and also by tackling photojournalistic assignments. I hardly ever work short assignments. For the series on albatrosses I virtually lived with them for six months. That way I had a lot of time to reflect on what I saw and could synthesize that into a handful of images.

"You have to have time because, firstly, you can't control an animal. And second, on any assignment you tend to begin by taking the pictures you already know how to take, and it's only with time that you begin to see other possibilities. That sometimes comes after two weeks, but sometimes it can take months. Often by the time I'm about to wrap up a subject I realize how it should have been done all along from the beginning. You never stop learning!" □

Excerpted by permission from Nigel Skelsey and *Photography.*

Peregrine falcon

Snow geese

Gentoo penguins

BHL

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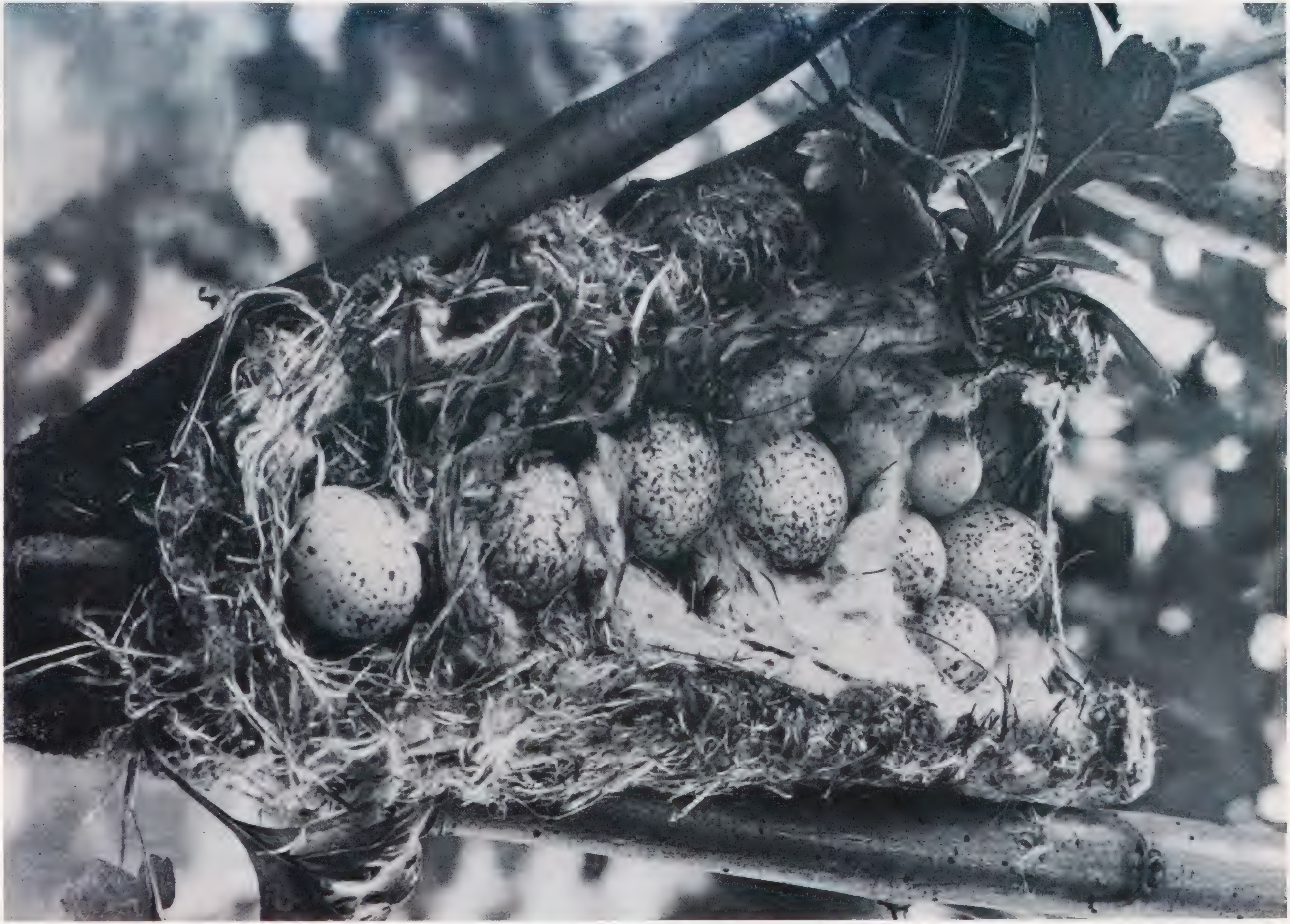


W. V. CRICH, F. R. P. S.

REJECTION, DESERTION, BURIAL, AND THE WANTON LAYERS

Donald S. Graham

When I was an undergraduate at the University of Guelph in southern Ontario, I spent my summers assisting one of my biology professors in his studies of the nesting success of the chipping sparrow. As I made my daily rounds checking nests, I frequently discovered the eggs of the brown-headed cowbird in with the sparrows' clutches. Sometimes the sparrows had abandoned these nests with the alien eggs, but often the sparrows accepted and incubated the cowbird eggs, later feeding the vigorously begging young cowbirds even though they soon outgrew their small hosts.

Cowbird leaves its eggs in nest of yellow warbler and, although the warbler repeatedly attempts to bury the eggs, the cowbird continues to add layers of potential offspring. If the cowbird eggs hatch, they may grow larger than the foster parents.

BILL IVY

I slowly developed a grudging respect for cowbirds. They simply lay their eggs in other birds' nests, leaving the unwitting foster parents to raise their young. This strategy certainly seems easier than that of most songbirds. In addition to mating, other songbirds must establish and defend territories, build nests, lay eggs, and then incubate them. After several weeks the eggs hatch and the parents frantically begin to feed the ravenous young. This process continues until the young can forage on their own. The nesting cycle of most species takes about two months and is extremely demanding and time consuming. The great tit, a European species closely related to chickadees, has been observed feeding its nestlings 1,000 times a day.

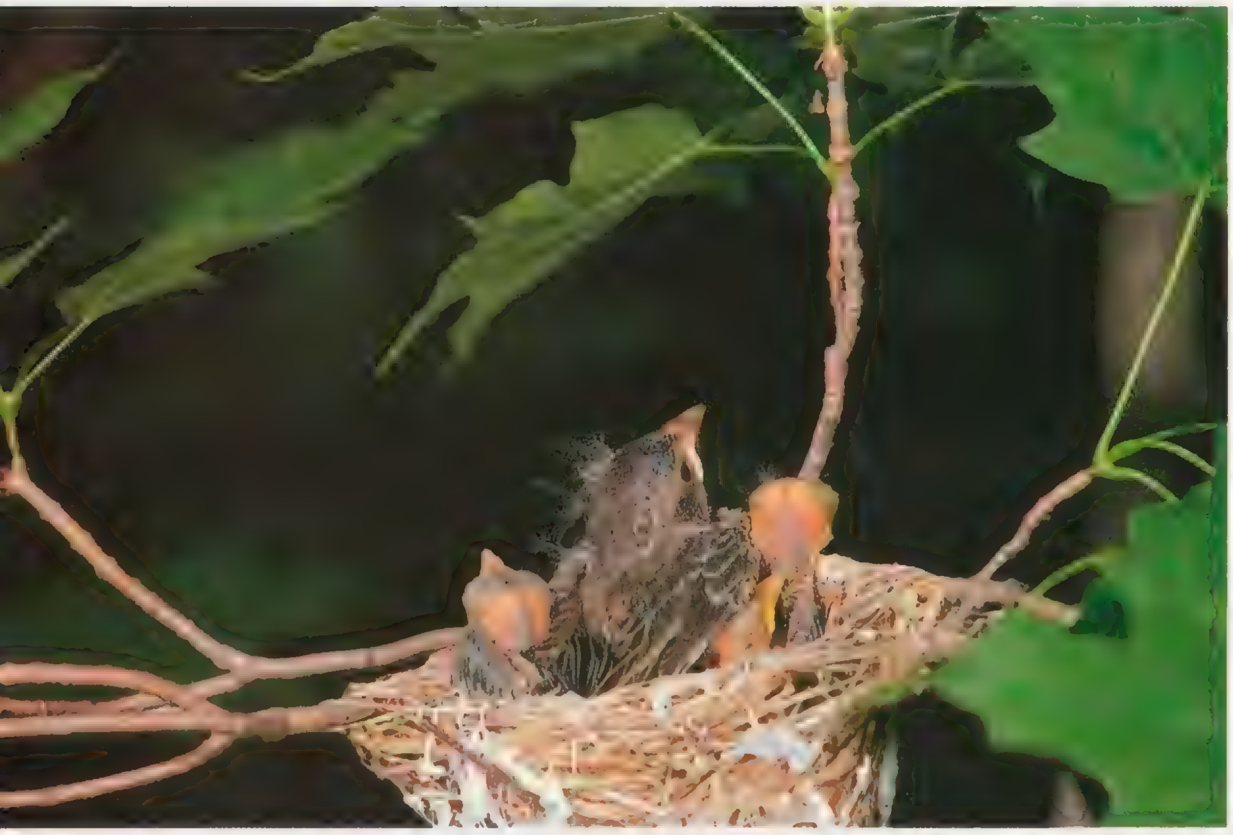
Brood parasites such as the brown-headed cowbird escape all this labor and fuss, while chipping sparrows, red-eyed vireos, northern cardinals, yellow warblers, and over 200 other victimized species get saddled with the parental responsibilities.

Because brood parasites can focus all their energy on egg production, they are often prolific layers. Indeed, the brown-headed cowbird, North America's best-known brood parasite, has been called a passerine chicken.

Each breeding season, a female cowbird lays about twice her body weight in eggs—an amazing 25 to 50 eggs. Songbirds that must raise their own young manage at most about 15 eggs a season. In addition to producing a prodigious number of eggs, the cowbird lays its eggs in a number of host nests. This strategy counters the possibility that a single catastrophic event, such as an act of predation, could wipe out an entire year's egg production.

If brood parasitism is much more efficient than do-it-yourself nesting, why isn't the world overrun with brood parasites? The answer is not clear, but it may be because the eggs of parasites have a low rate of survival. For instance, David Scott and David Ankney of the University of Western Ontario in London, Ontario, estimate that cowbird eggs have only a 15 to 30 percent chance of living to fledglinghood, while the fledging success rate for other nesting songbirds is between 22 and 70 percent. The survival rate for other brood parasites such as the shiny cowbird is similarly low.

These low brood parasite survival rates are the result of what are called antiparasite behaviors—forms of one-upmanship that have evolved in the host species. Hosts may toss out, cover over, or abandon parasites' eggs found in their nests. In all three cases, the eggs go unincubated.



GREGORY SCOTT

Above: Humongous cowbird nestling dominates its scrawny vireo siblings, and exploits the parents' tendency to feed the largest first.
Right: The fate of the speckled cowbird egg will be decided when the adult wood thrush returns. Below: With few territorial responsibilities, the male cowbird's role in reproduction is limited.

Some larger hosts, like the American robin and blue jay, deal with cowbird eggs by ejecting them from their nests with their bills. This takes only a few moments. Indeed, the speed with which they remove cowbird eggs makes estimating the frequency of parasitism in these species difficult if not impossible for ornithologists.

Smaller hosts are unable to defeat parasitism by force; they use passive resistance instead. The diminutive yellow warbler, apparently too small to eject cowbird eggs from its nest, buries them under a new nest bottom or simply deserts its nest and eggs.

Other small hosts also abandon parasitized nests. Wanting to know just how often this behavior occurs, I decided to conduct my own investigations of several commonly parasitized species. I spent hours poring over data files at the Royal Ontario Museum in Toronto, and discovered that from 25 to 50 percent of parasitized red-eyed vireo, yellow warbler, northern cardinal, chipping sparrow, and song sparrow nests are abandoned.

Why don't all small hosts abandon their nests when parasitized? Both nest desertion and egg burial consume precious time and energy, because the bird must toil over the construction of a new nest and lay a new clutch of eggs. The high cost of these activities may explain why small hosts tend to accept cowbird eggs but larger species almost always reject them.

Hosts take the offensive against brood parasite eggs because the invaders don't just add their eggs to the nest, they threaten the hosts' eggs and nestlings. For example, female cowbirds may remove host eggs from the nests and replace them with their own. If the host eggs are not displaced and they successfully hatch, young cowbirds often outcompete the host's young for food.

The behavior of the parasitic common cuckoo and African greater honeyguide toward their hosts is even more pointed. The just-hatched cuckoo, though still featherless and blind, will slowly raise the host's eggs upon its back and unceremoniously dump them on the ground. The honeyguide nestling slashes its foster nestmates to death with its sharp, hooked beak.

Not to be outdone by host responses like egg ejection and nest desertion, the brood parasite draws from its arsenal of counterresponses designed to foil the host. For instance, cowbird eggs look deceptively like the eggs of some of their hosts. This similarity may have evolved to make retaliation difficult for the host since it can't tell its own eggs from parasite eggs. Another host response is an unusual amount of aggression toward female cowbirds near their nests. Presumably this host behavior evolved to frighten female cowbirds from the nesting area, but some ornithologists suggest that female cowbirds have countered this aggressiveness by actually using host aggression as a cue that the host's nest is nearby.

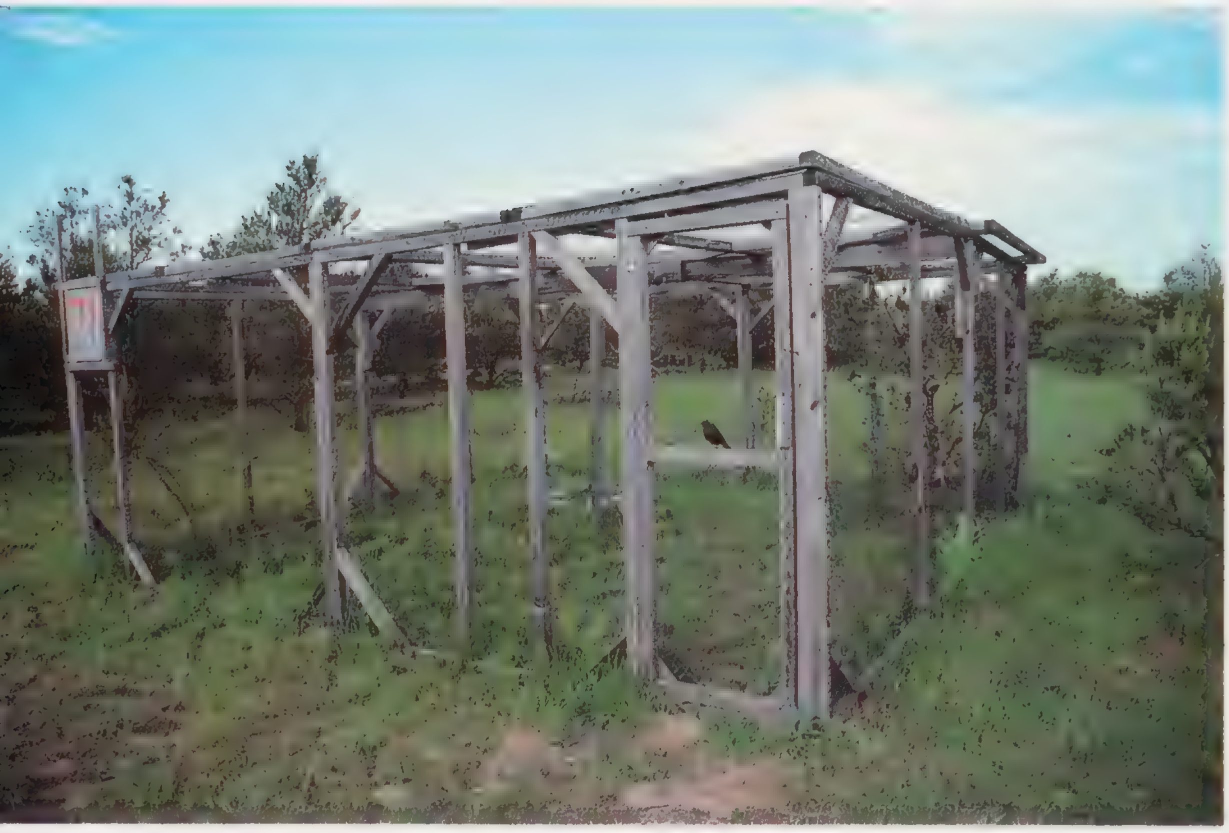
The most finely evolved adaptation of a brood parasite to its host occurs in Africa, where a genus of birds called indigobirds parasitizes a group of finches known as firefinches. Young firefinches have bold color patterns inside their mouths and on their down. Each species has its own unique patterns, and it is probably these patterns that enable firefinch parents to recognize their own nestlings. The absence of the correct markings on a nestling means the firefinch parents have discovered a parasitic nestling in their midst. To continue parasitizing firefinch nests, each indigobird species has evolved to produce young that mimic the color patterns of the young of one firefinch species. Because every pattern is unique, each indigobird species can mimic and parasitize only one species of firefinch.

In addition to the patterned mouth and down, a young indigobird imitates the weird food-begging behavior of its firefinch counterpart: it twists its neck so that the head rotates almost 180 degrees before accepting food.

Brood parasitism has evolved in six major groups of birds—cowbirds, honeyguides, cuckoos, indigobirds, ducks, and one parasitic finch—and today occurs in about 75 different species. Biologists disagree about which conditions favor the evolution of brood parasitism. William Hamilton and Gordon Orians theorize

LEFT: BILL IVY. RIGHT: JOE McDONALD

that cowbird parasitism stems from the bird's historical habit of following migrating buffalo up and down the American prairies, foraging on the insects stirred up by the animals. Because buffalo were always on the move, nesting and raising young in a fixed site were probably difficult. Under these conditions placing eggs in other birds' nests may have been a successful breeding strategy. If the individuals that initiated this breeding behavior produced more offspring than nonparasitic individuals, the genes influencing parasitic behavior would multiply in the population. The result would be the brood parasite we see today.



DOUG PLUMMER (PHOTO RESEARCHERS, INC.)

This cowbird trap in Kirtland's warbler nesting territory in Michigan contains decoy cowbirds and has a one-way entrance like a lobster trap. Destruction of forest habitat has made the warbler vulnerable to cowbird parasitism.

One problem with this theory, however, is that some parasitic South American cowbirds do not rely on large migratory mammals to feed. Other researchers feel that brood parasitism may have evolved, not in response to a nomadic lifestyle, but as a last resort for females that have lost their nests and are ready to lay their eggs. The females deposit their eggs in a convenient nest in an attempt to produce at least some offspring.

Whatever the origin of the cowbird's parasitic behavior, the bird's apparent reliance on the buffalo limited its range to the prairies and Great Basin. When Europeans introduced cattle and cleared much of the forest, however, the cowbird spread across eastern North America, and west into California, Oregon, Washington, and British Columbia. Indeed, the cowbird has undergone one of the greatest range expansions of any native North American bird in the past 200 years. This growth has brought the cowbird into contact with many bird species and populations previously unexposed to parasitism. In small populations geographically isolated from the bulk of their species, parasitism may be dangerously lowering nesting success, threatening the very survival of these populations.

The best-known victim of cowbird parasitism is the Kirtland's warbler, a species whose breeding range is restricted to jack pine forests in a few counties in Michigan and whose numbers have dwindled to a few hundred. The cowbird, unknown in Michigan before the 19th century, is now a major factor in the decline of this warbler. Intensive efforts to trap and remove cowbirds from Kirtland's warbler breeding habitat are now being made. Populations of the golden-cheeked warbler and black-capped vireo in Texas are similarly affected by cowbirds.

Researchers are now discovering a new wrinkle in the old game of brood parasitism—species that have not been considered parasitic contain individuals that parasitize members of their own species. Such behavior has been documented in over 50 species, including the starling, house sparrow, and cliff swallow. It is unclear who is doing the parasitism: It may be females that have lost their own nests but are ready to lay, females that are unable to find nest sites, or females that are supplementing their reproductive output by laying one or two extra eggs in neighboring nests. Regardless of the circumstances, a bird that parasitizes its own species has one big advantage: The host will feed the parasitic young perfectly suitable food. For instance, a cliff swallow will feed the right brand of insects to both its own offspring and the parasitic members of its brood.

Although some parasitism within the same species occurs in songbirds, it happens most often in precocial species, such as ducks, in which the young leave the nest soon after hatching. In this case the cost to the host of raising a parasite is low because the young can find their own food and regulate their body temperature. Being parasitized actually may be advantageous to precocial species; a predator may take the parasite's young instead of the young of the host. By contrast, raising a parasite is more costly for those species whose young hatch helpless and featherless, and must be fed, warmed, and protected for weeks.

Typically, naturalists have had a hard time respecting the cowbird and other brood parasites. Many people find it difficult to avoid taking a moralistic human stance toward species that use the labor of another to their own advantage, perhaps to the detriment of a host's young. But such an attitude obscures the inventive quality of this breeding strategy and the remarkable evolutionary processes that have shaped this part of the natural world. ☐

Donald S. Graham obtained his M.Sc. at the University of Guelph in Ontario, where he studied responses of hosts to cowbird parasitism and how juvenile cowbirds recognize other cowbirds. He recently drew up bird habitat management guidelines for the Carolinian forests of southern Ontario and, as a researcher at the Long Point Bird Observatory in Ontario, surveyed populations of rare breeding birds.

Further Reading

Horsfall, J. A. "Cuckoo in the nest: The evolution of parasitism in birds." In *The Encyclopedia of Birds.* C. M. Perrins and A.L.A. Middleton, eds. Oxford: Equinox Ltd., 1985.

THE HAWK CONNECTION

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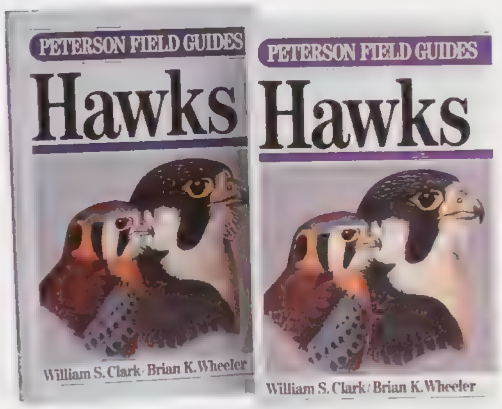

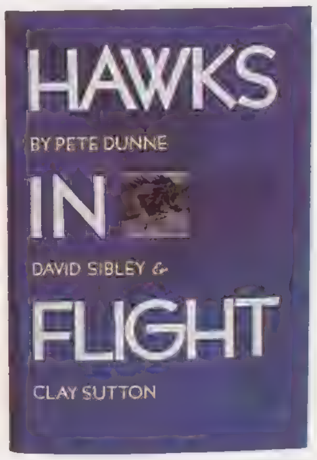

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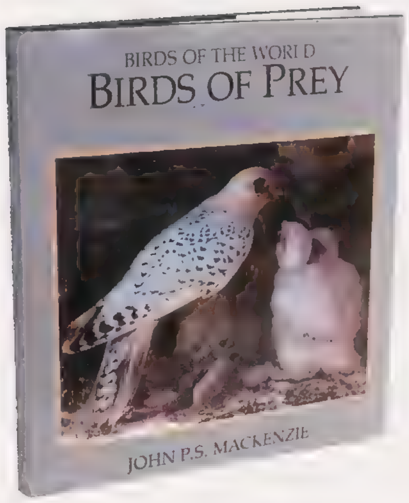

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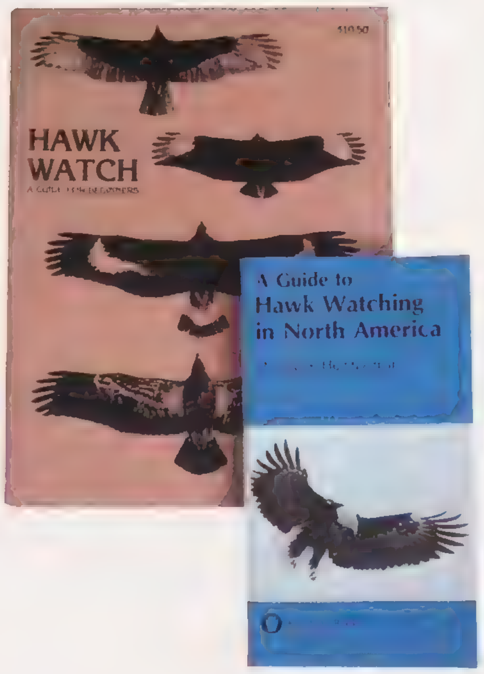

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A Hero Among Conservationists

Wildlife conservation has become burdened by the yoke of a bureaucracy that stifles individual accomplishments. The days when an Aldo Leopold, a William Hornaday, or a Rachel Carson could shape a major conservation effort are, for the most part, over. Today, government agencies and an expanding cadre of private conservation organizations have diluted the accomplishments of even the most dedicated conservationist, and in recent years few genuine heroes have emerged.

Nonetheless, the 1989 recipient of the Arthur A. Allen Award stands out as a hero among bird conservationists. Tom Cade has relentlessly pursued and finally realized an individual vision, that of restoring the peregrine falcon to parts of North America where it had disappeared after decades of pesticide-induced reproductive failure. An offshoot of his lifelong passion for raptors, this vision began to crystalize when he joined the Cornell University faculty in 1967. Over the subsequent 20 years Tom's dream became reality because of his single-mindedness and the cooperation he obtained from many others who espoused his vision of a world that had to include the peregrine falcon, a spectacular bird that has become symbolic of the environmental damage associated with chemical pollution.

Tom has already received many accolades and awards for restoring the peregrine falcon to the eastern United States. He is receiving the Allen Award not so much for achieving this goal as for *how* he achieved it. The Allen Award is bestowed by the Cornell Laboratory of Ornithology upon those who have made outstanding contributions to ornithology while wedding the activities of professionals and amateurs. Recipients have all made the scientific study of birds accessible and understandable to the public through their professional accomplishments in research and education. Tom Cade engineered the restoration of the peregrine falcon by forging a liaison among several groups of bird enthusiasts which have not always cooperated with each other: biologists in academia, falconers, bird watchers, bird conservationists, and bureaucrats in conservation agencies. As a student and associate of Tom Cade I have witnessed a one-man tour de force that provides a model of how an academic ornithologist can influence bird conservation.

Restoring peregrines meant that large numbers of birds would have to be bred in captivity and then released to the wild. At Cornell, Tom found an environment in which he and his students were free to pursue these activities, which are not traditionally part of an academic program in ornithology. Tom's colleagues at Cornell trusted him and supported his project long before most of academia was sympathetic to scientists who focused their intellectual energies on such applied matters. Cornell's Division of Biological Sciences provided the building at Sapsucker Woods which became the hub of the peregrine recovery effort and which will always be known to those associated with it as "the hawk barn."

Tom Cade as a young man, peregrine in hand.

Having a nurturing home base was not enough; Tom also needed the birds and husbandry skills to make captive breeding and reintroduction a reality. A falconer for most of his life, Tom knew that the intimate rapport falconers develop with their birds would have to be emulated for him to succeed with his program. In addition, falconers possessed birds badly needed for breeding stock. Tom attracted some of the best and brightest falconers and their birds to his camp, and he soon became respected in falconry circles as a man who appreciated and freely acknowledged the many contributions that falconers make to the conservation of birds of prey. In falconers Tom had spiritual and technical allies who helped his program work.

Tom's vision also needed financial backing. Although the funds that supported his efforts came from many sources, generous contributions were given by the general public to support the Peregrine Fund, created by Tom in 1971. Many provided money while others volunteered to care for released peregrines as they made the transition from captivity to the wild. In all nearly 10,000 individuals believed in Tom and gave what they could to keep his program alive. Conservation-minded people recognized a promising and exciting program when they saw it, and Tom repaid their investments with the best of all possible dividends: free-flying peregrines.

Restoration of the peregrine could occur only with the blessings of a conservation establishment that operates in the political arena. Tom's plans required endless paperwork and permits, for what he was proposing had never before been undertaken by one person. Even the government had not tried the type of large-scale restoration of an endangered species which Tom had in mind. Where lesser individuals might have recoiled from the morass of red tape and bureaucratic intrigue that the peregrine restoration effort often engendered, Tom either diplomatically lobbied foot-dragging bureaucrats or, when that failed, overwhelmed them with his intellectual prowess. With a bit of righteous indignation and a lot of perseverance Tom cleared the path for his peregrine program and for other endangered bird programs modeled after it.

Today, peregrines are back in many parts of their former range in the eastern United States, and we all owe Tom Cade a great deal for making the return of the peregrine falcon a reality. That he accomplished this monumental achievement by orchestrating a diverse corps of amateur and professional ornithologists and conservationists confirms his worthiness as a recipient of the Arthur A. Allen Award.

—**Stanley A. Temple**

Western bluebird nestling and egg. Photo by Mary Clay.

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A FIELD GUIDE TO HAWKS OF NORTH AMERICA by William S. Clark and Brian K. Wheeler. 1987. Houghton Mifflin Company, Boston. 24 colorplates, numerous black-and-white photos. 198 pages. $13.95 (paper).

Understand my bias. On one hand, the author of *Hawks*, Bill Clark, and I have been friends for 12 years. On the other hand, Bill and I have markedly different approaches to hawk identification, which we've projected into two separate books that vie for space on the bookstore shelf.

So, if you conclude that between the polar tugs of friendship and free enterprise I am incapable of drawing an objective bead on *Hawks*, you are correct. But who ever said book reviews are objective?

Now that your expectations are properly calibrated, let me first say that I like *Hawks*. I like it a lot and consider it a major achievement in aiding hawk identification. I own two copies—which is the same number I have of my own guide—and even if you're only partly rabid about North America's birds of prey, you should own two copies, too—one for your library and one for your car. Everyone else (Republicans, Democrats, Shriners, Amway representatives) can get away with one copy.

There is nothing revolutionary about *Hawks*—unless you believe, as I do, that putting a boatload of useful information about raptor identification into one book is revolutionary. The format is well structured and straightforward, and if you are familiar with other Peterson Field Guides, you can pick up *Hawks* and start filling neurons immediately. In the spirit of a field guide, the text is succinct. It leans toward comparing the field marks that distinguish one raptor from another rather than walking the reader through the identification of each separate species. Field characteristics discussed in the text range from the old tried-and-true standards of the hawk-watching trade: "On gliding, [the sharp-shinned hawk] head does not project much beyond the wrist," to the esoteric "[The eye of the sharp-shinned] is centrally placed on side of small, rounded head." Key points are italicized. The sheer volume of information stretches the capacity of the format, and it does require a certain amount of attentiveness to absorb. But the information is all there. Even raptor identification experts of long standing can pan through the text and extract golden nuggets of insight.

Please excuse me for not wasting anyone's time quibbling about the accuracy of the field marks. First, it's poor form. Second, as all the world knows, the arguments of experts are endless. Let me just say that little is known about raptor identification that is not known by Bill Clark and Brian Wheeler, and their guide has been crafted to carry this wealth of knowledge.

Wheeler's illustrations are meticulous, almost surreal in their detail. Flight silhouettes depict both gliding and soaring postures for most species. Close-ups highlighting key field marks are generously planted on the colorplates. Head-on silhouettes are a thoughtful inclusion. All these illustrations make some plates a tad busy—but how much more did you want to spend on this book, anyway?

Wheeler's depictions of shapes have been criticized as "stiff." I think that the term "stylized" is more apt. The shapes and proportions are almost Socratic in their striving. Unless I miss my guess, the stylization was an intentional effort to minimize variables associated with overall shape, so that plumage—Clark and Wheeler's trump—would be emphasized. Indeed, the writer and artist have thoroughly investigated the complex subject of raptor plumage. Much of what they say about determining age and sex on the basis of plumage has never been said before. This alone is grounds for purchasing the book.

The photographs, measured in terms of image quality, are a mixed bag. Some of Clark's photos reproduced well, others did not. Measured in terms of usefulness, all but a few photos get passing grades, and subsequent editions will undoubtedly show improvements in photo size and shape.

A few of the book's more compelling features: excellent range maps, an illustrated page showing the topography of a hawk, a plate illustrating poignant silhouettes of dark-phased raptors, and a collection of black-and-white photos depicting both perched and flying raptors.

Other reviewers of this book have found it weak in the subtle areas of flight identification and that ugly-sounding undefinable called "gis" (general impression and shape). I think I can offer some insight into this alleged lack.

The reviewers most troubled are accomplished hawk watchers—members of that narrow band of the bird-watching spectrum whose discipline is identification of raptors at incredible distances. Field guides catering to this discipline have followed the edict "farther is better," that is, they have concentrated on tips for identifying far-away birds.

But *Hawks* is a different cat, somewhat iconoclastic. It says to the hawk-watch crowd, "Hey, you missed something." And indeed we did. Looking far, we never looked close. Now, with *Hawks*, we can.

—*Pete Dunne*

HAWKS IN FLIGHT: THE FLIGHT IDENTIFICATION OF NORTH AMERICAN MIGRANT RAPTORS by Pete Dunne, David Sibley, and Clay Sutton. 1988. Houghton Mifflin Company, Boston. 147 black-and-white photographs, black-and-white plates of all species in flight. 254 pages. $17.95 (cloth).

I was dubious last fall when I heard that *Hawks in Flight* by Dunne, Sibley, and Sutton was on the bookshop shelves. The previous year had seen the publication of *A Field Guide to the Hawks of North America* by Bill Clark and Brian Wheeler. That book provided hawk watchers with a superb field tool, one from which I have gleaned many tidbits on identification that had escaped me despite 20 years of intensive hawk watching. Was the world really looking for a second Houghton Mifflin raptor identification guide, published so soon after the preceding triumph?

Upon examining the book I quickly found that my doubts were unfounded. Anyone interested in the 23 species of raptors covered by *Hawks in Flight* who fails to buy the book will be committing a grievous error. In contrast with *A Field Guide to the Hawks*, *Hawks in Flight* emphasizes holistic field characteristics useful in identifying hawks at a distance, such as birds' proportions and flight patterns; therefore, these two books are ideal companions in the bird watcher's library.

In *Hawks in Flight*, Dunne and his cohorts have created a treatise that is equally satisfying as a field guide, a study reference, and a leisure-time book. It presents a wealth of very readable information to both the novice and veteran hawk addict, and its grouping of species by genus and shape and placement of illustrations near the species being discussed make it easy to use.

Dunne's text flows in his trademark tongue-in-cheek style. The introductory chapters explain how to use the book and discuss the development of the art of identifying raptors in flight. Each species account covers identification by behavior, plumage, and holistic field characteristics, including size, shape, proportions, flight profiles, and flight styles (soaring, flapping). Accounts also include information on each bird's ecology and relationships with humans. Besides enlightening the reader with abundant facts, Dunne, always the teller of tales, regales his audience with stories—a goshawk that appears to attack a deer, for example, and why Cooper's hawks are better accepted by today's society than they were by European settlers: "[Probably] not from a better understanding of the role of predators," Dunne writes, "but from a reliance on the supermarket shelf as a source of chickens rather than the backyard henhouse."

If Dunne's text alone isn't enough to recommend buying the book, Sibley's excellent illustrations seal the endorsement. The superb black-and-white line drawings portray species' flight profiles in a lifelike manner and highlight shape and proportions such as head/tail ratios and tail length. The emphasis on flight profiles illustrates subtle differences between similar species, such as Cooper's and sharp-shinned hawks, and within species, for example, immature and adult red-tailed hawks. Furthermore, the art is reinforced by Clay Sutton's photographs, which help to illustrate holistic field marks as well as detailed plumage patterns.

I find little to criticize in this book. Some of the photographs are a bit fuzzy. The lack of range maps is annoying at times, but consulting *A Field Guide to the Hawks* along with this book solves the problem. One major error occurred in the first printing: the plate label on page 80. C should be prairie falcon; D should be gyrfalcon; E should be peregrine falcon. This error will be corrected in future printings, and all other problems are minor.

My biggest complaint about this book is that budding hawk watchers across the continent can now advance rapidly in their knowledge of hawk identification. No longer will they have to spend decades observing hundreds of thousands of hawks, enduring sunstroke and frostbite, to become reasonably proficient at identifying distant specks. I am envious. If the book had appeared 20 years ago, it would have saved a whole lot of eyestrain and added years to my career.

Dunne, Sibley, and Sutton have helped the art and science of hawk observation take a great leap forward.

—*Gerry Smith*

BIRDWATCHING WITH AMERICAN WOMEN edited by Deborah Strom. 1986. W. W. Norton & Company, New York. Black-and-white photos and illustrations. 286 pages. $17.95 (cloth).

Birdwatching with American Women is an engaging anthology of ornithological writing by women whose lives span the years from 1831 to the present. Through the works of these women, the reader glimpses the evolution of ornithology in the United States.

Deborah Strom introduces the reader to 18 women, all of whom are fascinating and unique in their backgrounds, styles of writing, and contributions to ornithology. The writers are introduced chronologically by year of birth. Strom sketches the biography of each writer, identifying her place in ornithological history.

I compliment Strom on her selection of writers. Several are well known: Florence Merriam Bailey, the first woman elected to the American Ornithologists' Union; Anna Botsford Comstock, who helped to launch the nature study movement in New York in 1895 and was the first woman to achieve the rank of professor at Cornell University; and Margaret Morse Nice, a pioneer in behavioral ornithology. Other writers are less famous but their contributions to ornithology are just as valuable: Mabel Osgood Wright was associate editor of *Bird-Lore* for 11 years and one of the first woman directors of the National Audubon Society, and Althea Sherman wrote numerous articles for *The Auk*, *The Wilson Bulletin*, and *Bird-Lore*. Several other writers the reader may have never encountered are Cordelia Stanwood, a sensitive bird photographer from Ellsworth, Maine, and Fannie Hardy Eckstorm, a prolific writer whose stories centered around her father's fur-trading business with the Penobscot Indians of northern Maine.

Each account provides a good sample of its author's style. Furthermore, the selections provide a variety of geographic perspectives on birds and natural history in North America. Celia Thaxter focuses on the birds of the Isles of Shoals, located off the coasts of Maine and New Hampshire. The selection by Sarah Orne Jewett about Berwick, Maine, circa 1886, hints at what later became a major issue in ornithology—an urban dweller seeks the plumes of a snowy egret. Mary Hunter Austin's 1903 account of scavengers in the San Joaquin Valley in California is enlightening for a Northeasterner like me. In an excerpt from "The Lovely and the Wild," Louise de Kiriline Lawrence shares her discovery of birds. She was left alone in the wilderness of Ontario for five years while her husband was away during World War II, and birds became the focus of much of her energy.

Birdwatching with American Women is a fine collection that can be enjoyed by both women and men who are interested in birds. The book is also strong motivation to read more works by these women who contributed so much to ornithology.

—*Sally Sutcliffe*

Starlings

ROBERT VILLANI

A starling may join a flock to protect itself from northern harriers and other flying predators. A lone individual is easier to pick off than a single bird concealed within a flock.

Most people consider starlings unpleasant birds that hardly deserve to be listed in field guides and that are of no more interest to bird watchers than earthworms or dandelions. As behavior-watchers, however, we enjoy starlings just as much as any other species, and over the years we have seen them demonstrate some fascinating behaviors.

One of their most intriguing habits is that of forming flocks in a variety of circumstances and at different times of the year. For much of their lives, starlings are very flock-oriented birds. Shortly after the breeding season starts in early summer, you will begin to see small flocks composed of juvenile birds that have just fledged. These brownish birds gather in open areas and feed together on the ground. We see them most often in fields and along median strips or cloverleaves as we drive along turnpikes. These flocks grow larger as the season's second brood begins to fledge. After breeding is finished, these juveniles are joined by adults. Why these flocks form is not known for sure, but they may provide some protection from predators, in particular bird-eating hawks such as goshawks and sharp-shinned and Cooper's hawks.

Flocks can provide protection in at least two ways. One traditional explanation for flocking is that if you are an animal out in the open with no place to hide and you are attacked by a predator, then your best protection is to hide behind another animal. When all animals in a group try to hide behind one another they form a tight cluster, such as a school of fish in the ocean or a flock of birds in the air.

We once saw a superb example of this flocking when a group of starlings was being attacked by a peregrine falcon. At the sight of the peregrine the starlings formed a tight ball in the air, and when the peregrine dove at them, the whole flock swerved in what appeared to be evasive action. This example also points out the second advantage of flocking when a predator attacks—the predator has a harder time singling out and attacking an individual. A split second of indecision by the predator may save the life of a bird in the flock.

Because of its large size, a flock may be able to take the offensive when faced by a potential threat. For example, one winter morning as we walked out of our house and descended the dirt driveway, our attention was grabbed by a tight flock of starlings a hundred feet in the air circling in an almost ameboid mass. In unison they dove onto a much larger bird that was slowly soaring below them. Even though the sun glared in our eyes we recognized the silhouette of the species involved—the flock of starlings was attacking a red-tailed hawk. As a flock they became an effective adversary of the hawk and, after repeatedly diving on it, forced it to leave the area.

Each night throughout the year, starlings exhibit another spectacular feature of flocking: they form communal roosts that can contain from a few hundred to several hundred thousand birds. Perhaps you have seen some aspect of this roosting behavior, such as starlings gathering in treetops in the late afternoon or diving under city bridges at dusk.

You can watch much of the behavior associated with these roosts, especially if you live in an urban area where there are large numbers of starlings. In late afternoon, look for small flocks flying over the treetops. They will be joined in midair by other small flocks and soon form a river of birds all moving in the same direction. Occasionally several hundred birds may dive out of the flocks and settle in large trees along the way. The birds remain in these trees for varying periods of time, with new members joining them and others leaving to join the main group. These trees are called pre-roosting sites, and the same locations may be used night after night for weeks or months.

As dusk approaches, all the starlings leave the pre-roosts and fly en masse to the main roost, which is usually a protected spot with lots of perches, such as under a big bridge, beneath the eaves of a large building, or in a dense grove of trees. As the birds approach the roost they circle above it and then make a dramatic dive into it. While perched at both the pre-roost and roost sites the birds make a great deal of noise. In some cases it can be so loud and continuous that it sounds like a waterfall. We have visited starling roosts in the middle of the night and the birds were noisy even at that time. At dawn, all the birds leave and are quiet as they do so.

No one knows for sure why the birds make such spectacular dives into the roosts or make so much noise while perched. One theory is that these actions advertise the presence of the roost to other starlings and that larger roosts serve the purposes of the birds in some way.

Roost sites may be reused for

Donald and Lillian Stokes are the authors of Stokes Nature Guides and the newly published *Bird Feeder Book.*

years, or they may change location slightly at any time. The number of birds using them is lowest in spring and summer when roosting birds are mostly breeding males and unmated birds. At this time the females remain in their nest holes incubating eggs or brooding young. The juveniles swell the ranks of the roost in summer, and by fall the roosts are at their largest.

But the big question is "Why?" Why should all of the starlings within a 20- to 30-mile radius come together at one spot each night? Flying all that distance to roost would seem to cost them a great deal of energy. Scientists have offered various theories. One is that the more birds on the lookout, the fewer birds will be eaten by predators such as night-hunting great horned owls and screech-owls. Some have suggested that roosts may be located in places that provide protection from the weather, such as wind or precipitation, and that the birds may even get warmth from perching close to each other.

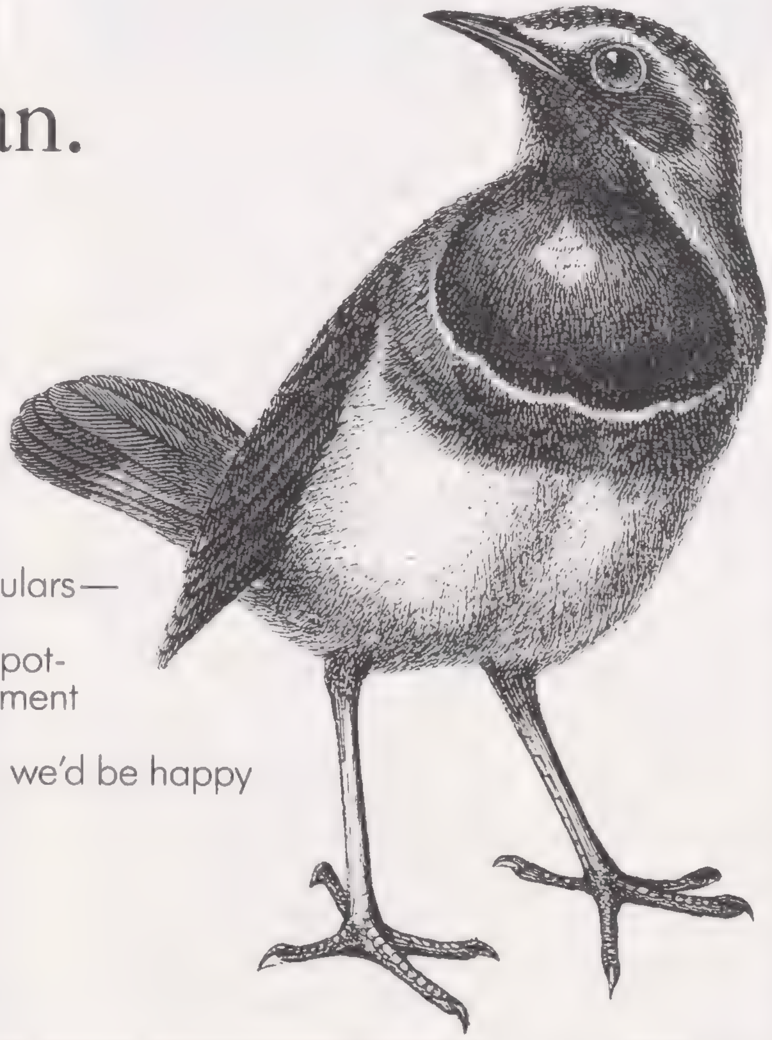
The noise at the roost can be so loud and continuous that it sounds like a giant waterfall.

Other scientists have suggested that roosts may be a way for birds to find food: The birds that enter a roost are either well fed or hungry. The hungry birds find well-fed birds in the roost and follow them to their source of food. And finally, roosts may be a way of finding a mate, sort of a giant singles' bar, and since the birds come together from long distances, this may help to mix the genes which in turn may lead to better-adapted offspring. Each of these theories has its advantages and drawbacks, but as yet none of them explains all of the behaviors associated with roosting.

Communal roosts occur in other species of birds, such as robins, blackbirds, crows, ravens, herons, mourning doves, vultures, pelicans, gulls, and numerous others. Some ornithologists have tried to come up with a theory of roosting that fits all species, but this is hard to do since roosting behavior is so varied. Our guess is that roosting serves a multitude of purposes, depending on the species, the age and sex of individuals within a species, and even the time of year.

One thing is clear: the behavior and dynamics of starling flocks are fascinating to observe. Whether the flock is oriented to protection, attack, feeding, or roosting, a great deal more can be learned by people who take a moment to stop and watch.

—Donald & Lillian Stokes



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DOUG PERRINE

The World Was Never Made For One As Beautiful As You

You sit in a wooden boat deep among the mangroves of Trinidad. The sun sinks in the sky, casting light on the trees turned emerald against a deepening blue sky. Your companions are silent as the squeaks and gurgles and chirps of a tropical estuary fill the air. Suddenly, out of the corner of your eye, you glimpse a flame-colored bird streaking across the sky. Another shoots past, then another. Soon vast V-formations of fire-red birds glide through the air. As the sun disappears into the sea, the mangrove trees blaze and the green of the leaves is lost beneath a cloak of flame.

You have just witnessed the roosting of the scarlet ibis in Caroni Swamp on the island of Trinidad. Scarlet ibises forage in both coastal and inland wetland habitats, feeding from fresh, brackish, and saltwater ponds, lakes, streams, and marshes. The birds are found in South America from the eastern portions of Colombia to northern Brazil, with the core of the population in Venezuela, Trinidad, French Guiana, British Guyana, and Surinam (also collectively known as the Guianas).

Roosting in colonies as large as 50,000 individuals, scarlet ibises are skittish and fickle birds, especially where nesting is concerned. If conditions are not right at the beginning of the nesting season, or if they are unduly disturbed, nesting will be postponed or abandoned, or the birds will go elsewhere to nest. Such changeable nesting habits make it difficult to assess the true size of ibis populations.

But the fact that human activity has negatively affected the ibis is obvious. In Trinidad, for example, the species was openly hunted from the 19th century until the creation of a sanctuary on its roosting grounds at the Caroni Swamp in 1953. During this period breeding was rare. Once the sanctuary had been established and wardens posted to prevent disturbances to the birds during the nesting season, breeding occurred regularly in spite of the October to March open hunting season.

After gaining independence in 1962, Trinidad designated the scarlet ibis its national bird. Trinidad and Tobago legislated total protection from hunting for the ibis in 1963 and its future seemed secure, but for some unexplained reason game wardens were withdrawn in the late 1960s. The amount of poaching rose and tourist traffic increased, to the detriment of the peace-loving birds. Tourists viewing the tranquil scene of thousands of scarlet birds tucking in for the night were sometimes startled by shotgun blasts that caused the entire flock to rise up and abandon the roost.

Since 1970 ibises have not bred in Trinidad, but have flown to neighboring Venezuela to breed every summer, returning to Trinidad to feed in the fall. In 1980 the government of Trinidad shocked conservationists by inexplicably legalizing the hunting of its national bird. That directive was finally reversed in 1987. A proposal to create a national park in the Caroni Swamp has been tabled since 1979, and today the swamp is managed by the Ministry of Agriculture, Lands, and Development as a forest preserve in which hunting, logging, and tourism are allowed. Although a small wildlife sanctuary is maintained around the roosting trees of the ibis, development and road construction continue to eat away mangroves surrounding the swamp. Sewage and industrial and agricultural wastes have turned the river into an open sewer carrying a "green-black horrifyingly stinking liquid that could be called anything but water," according to David Rooks in a 1985 issue of *Trinidad Naturalist*. By a combination of pollution, harassment, habitat destruction, and outright slaughter, Trinidad may achieve the dubious distinction of becoming the first country in the Americas to exterminate its national bird.

Venezuela, with its vast seasonally flooded inland prairies, has become the last great refuge of the scarlet ibis. Conservation laws prohibit both the taking of the ibis and trafficking in ibis products. But the future remains uncertain. Even with the establishment of national parks the birds are not sufficiently protected; in 1983 overdevelopment on the perimeter of the parks and excessive disturbances by visitors drove away the last major breeding colony on the Venezuelan coast.

The larger populations are now in the interior freshwater wetlands known as "llanos." These llanos, once thought to be safe from developers, have begun to attract oil exploration and new agricultural technologies. A professor from the Universidad Ezequiel Zaniora, in the inland region, recently took a group of visiting ornithologists to what was once Venezuela's largest rookery. They were shocked to find that not only the ibises but the trees had disappeared. Bulldozers had leveled the entire site. Conservationists meeting to discuss strategy to protect the llanos found that a group of agricultural engineers was holding a conference in the next room of the same hotel to plan methods of draining the llanos.

Charles Luthin, Pan American officer of the International Council for Bird Preservation (ICBP), is urging immediate action to ensure the safety of this spectacular bird throughout its breeding areas. "People think of extinctions as something that happened in the past," he emphasizes, "but this is happening right now. Only two years ago ibises nested on the coast of Venezuela. Now they don't." He points out that although large numbers have been counted in the Venezuelan llanos, over 90 percent are concentrated in only four colonies. In fact, over 40 percent of the llanos population were counted in a single large colony. Such dense colonies make the birds extremely vulnerable.

In addition to the environmental destruction in Trinidad and Venezuela, a grim situation has developed in nearby French Guiana. A cottage industry has sprung up around the creation of artificial flower arrangements crafted from the feathers of scarlet ibis and other birds. The flowers were introduced in 1934 by the sisters of St. Paul as a way of busying the prisoners of the infamous French penal colonies at Devil's Island. In 1947 one of the sisters moved to the town of Sinnamary, where she taught flowermaking to the local women.

At first the feathers were taken only from birds that had been slaughtered for food. But as the arrangements became more popular, the birds were shot for their feathers. The women have formed a cooperative to market the flowers, an arts center was built in 1980 to display and sell them, and a new road was built to accommodate a growing influx of tourists. Between 100 and 300 women are involved in flower production.

Scarlet ibis feathers are used in more than 50 percent of the flower arrangements. One popular design requires nine

MARGARETTE MEAD

BARBARA MILLER

Left, below, above: A tree dotted with roosting ibises, Trinidad's dollar bill with its national bird, and a preening individual. Not shown: Industrial and farm wastes running into an ibis roosting area, artificial flowers made of ibis feathers, and a flock of ibises abandoning a roost at the sound of shotgun blasts.

DOUG PERRINE

Changes in population size may be an artifact of survey techniques or a reflection of real changes in ibis numbers; however, the birds' sensitivity to human disturbances is not an encouraging sign.

black-tipped primary flight feathers. Since an ibis has only eight, more than one bird must be killed to produce each flower.

The ibis finally received official protection in French Guiana in 1986, but enforcement is minimal. Poaching is common during the nesting season, which unfortunately coincides with the peak of the tourist season. Although the gendarmerie is located across the river from the ibis rookery, the station closes at 6 p.m., just as the ibises return to roost. The gendarmes go home, leaving the rookery to the poachers at the optimal hunting hours.

Other nations have taken steps to protect the scarlet ibis, with varying degrees of success. Although the scarlet ibis is not listed as endangered by the International Union for the Conservation of Nature, in Brazil habitat destruction has so reduced ibis populations that the authorities have declared the bird a nationally endangered species. The ibis is not carried on the CITES list banning international trade in products of threatened species, but Surinam has banned both hunting of and trade in scarlet ibis products. Unfortunately political upheaval in recent years has limited enforcement of conservation laws. During aerial counts coordinated by Dr. Ariel Spaans of the Netherlands Research Institute for Nature Management, poachers were observed inside the nesting colonies.

One factor impeding conservation efforts on behalf of the scarlet ibis is a lack of solid data on which to base population estimates. Aerial surveys offer the only practical method of making these estimates. But because the birds may delay nesting by a month from one year to the next, and move their breeding site by hundreds of miles, comparative data are hard to collect.

For example, aerial surveys tallied 2,000 nests in the three Guianas and 66,000 nests in Venezuela in 1983. The next year, the count rose to 11,000 nests in the Guianas, but only 47,000 nests were observed in Venezuela. No surveys were conducted in 1985. In 1986 the number of nests in the Guianas had increased again, to 40,000, but very little nesting activity seemed to occur in Venezuela, perhaps because of poor environmental conditions. Because of the ibis's variable nesting habits, it's hard to tell whether fluctuations in population size are an artifact of the survey technique or reflect real changes in the numbers of scarlet ibises. However, the extreme sensitivity that the birds have shown to human disturbance does not bode well for their future.

While the spectacle of baskets of ibis eggs and live nestlings and vats of pickled adults for sale is no longer common in the markets of South America, habitat destruction poses a more permanent threat. Conservationists are taking action. The first international workshop on scarlet ibis conservation, sponsored by the ICBP, the Audubon Society of Venezuela, and Wildlife Conservation International, was held in Caracas, Venezuela, in March 1988. For the first time, researchers and conservationists from throughout the birds' range met to exchange information and to develop a plan of action to save the birds.

Whether their efforts will be sufficient to protect the scarlet ibis from the rising tide of development and pollution remains to be seen.

—Doug Perrine

For more information about scarlet ibis conservation efforts, contact Charles S. Luthin, Pan American Officer, ICBP, P.O. Box 1369, Melrose, FL 32666.

Doug Perrine is a photojournalist and naturalist specializing in aquatic life of the West Indies. He received assistance in preparing this article from ICBP, the Venezuelan Audubon Society, the Brehm Fund for International Bird Conservation, and Discovery Island Zoological Park, Disney World, Florida.

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Photo of Western Flycatcher by Greg R. Homel

Nods in the Dark

How many of you, I wonder, know what you'll be doing at 5:00 a.m., May 13, 1989—where, with whom, and why? I do.

I'll be standing on a lonesome bridge with a ridge to my back and just the most perfect little meadow stretching out before me. I'll be with two or three people whose friendship means a lot to me. And we'll be standing silently, senses strained, waiting for the touch of sunlight that will burst the world into song.

May 13 is B-Day, Big Day, the date of the sixth Annual World Series of Birding.

"Oh, no," you think, "not another big-day piece. I am bored beyond expression with this nonsense and wish that these big-day birders would grow up and spend their time contemplating chickadees, developing squirrel-proof bird feeders, or saving the rainforest."

Excuse my impertinence, but if this is your opinion of Big Days, you're selling them short. How do I know? Because I speak from experience. This used to be my attitude, too. Eleven years ago, I, too, decried the foolishness that made otherwise sensible people behave like billiard balls after a break and treat birds like inventory items. Big Days were an insult to serious bird study, I thought, and reduced identification skills and aesthetic appreciation to a mere game.

And then, at the invitation of a friend, I participated in a Big Day. Now I understand. Now I look forward to this annual rite of spring more than any other day of the year.

It may help if you can shake free of the notion that a Big Day is 24 helter-skelter hours. A Big Day is not a "day." That's a misnomer. It is a lifetime brought into focus. It is everything that I have ever learned about birds given purpose, a lifetime of illumination brought down to the intensity of a laser.

When a distant common yellowthroat calls and I recognize it, it justifies the new pair of school shoes I ruined in my quest for the bird calling *witchety, witchety, witchety* in tussock grass marshes near my parents' house. Treacherous stuff, tussock grass. And ovens, even set at low temperature, aren't the allies of mud-encrusted shoes one might hope they would be.

When an accipiter flashes across the sunroof of my car in something under half a second and I know, without a single dissenting neuron, that it was a Cooper's hawk, it's ten thousand hours of hawk watching brought to bear.

And when a flock of shorebirds flies high overhead, it's the ghost of my friend and mentor Floyd Wolfarth that whispers in my ear, "Watch those birds, watch them! Identify the flock, then pick out the oddballs. Size and shape. Size and shape. That's all you'll get at this distance. Look at that one. Second from the end. Smaller, am I right? Knot and a turnstone, I'd say. Am I right?"

Perhaps it takes something harebrained like a Big Day to free us of our everyday routine. After a while even the pursuits we most enjoy become banal. So go ahead. Be bold. Fight inertia. Do a Big Day and defy the night. And while the world sleeps you will move from point to premeditated point, from marsh to bog, from barred owl to bittern to nighthawk to sora to screech-owl. Don't forget, though, that when you shake off routine you run a little risk.

"Uh, yes, officer, we are just listening for a screech-owl. S-C-R-E-E-C-H-O-W-L: a small owl common in suburban woodlots. You see we are engaged in a Big Day . . . and . . . uh . . . . Where did we get this fancy car? Uh, well, we're loaning it from the company . . . I mean, they've borrowed it to us . . . that is . . . "

Perhaps you'll encounter another big-day team, drawn together, as you are, by challenge and friendship. But you'll pass no words to these birders-errant, and make no greater acknowledgment than solemn nods in the dark. Later, when midnight caps the Big Day, there will be tales and conversation to last a year. But now a barrier stands between you and one of birding's most cherished ethics—the ethic of sharing.

When you ask participants in the World Series of Birding, or any Big Day that abides by American Birding Association rules, if anything about the event troubles them, most say: "the prohibition on sharing information with fellow birders."

Maybe this is a good thing. Maybe, like a day of fast, it is good to have one day a year of informed denial to remind us how important sharing is.

But now is no time for metaphysical considerations. The sky in the east is graying at the edges. The great horned owls have stopped calling. The barn swallows under the bridge begin to chatter. A phoebe throws its challenge to the night, and the stars shiver and pale. And as the minutes pass, and the faces of your friends take on shape and expression, the world bursts into song.

—Pete Dunne

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Quarterly

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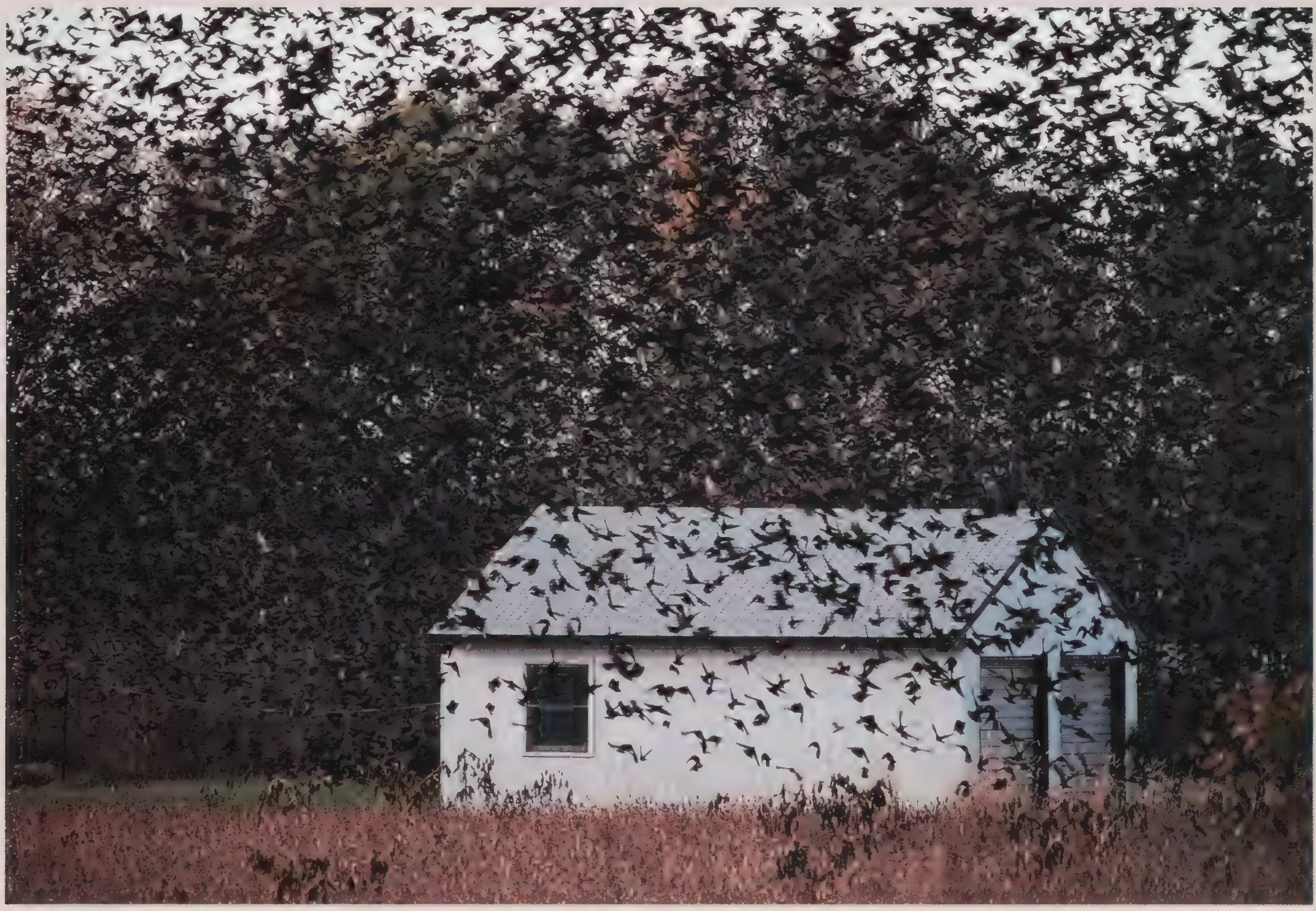

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There are approximately 15,000 red-winged blackbirds in this picture.

THE LIVING BIRD *Quarterly*

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Front Cover: Tim Fitzharris photographed these white storks while on assignment in Europe for *The Living Bird Quarterly*. The storks are busily nesting on an Austrian rooftop. Tim is clinging belly down to the same roof, a gathering crowd ogling below. Details of Tim's trip begin on page 14.
Back Cover: Blackbirds cover the road on a foggy summer morning in Manitoba. Photograph by Art Gingert.
Right: 'I'iwi, Hawaii. Photograph by Jaan Lepson.

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5 BIRDNOTES

6 A BIRDER'S NOTEBOOK *by Michael Harwood*
Innumerable shotguns once blasted innumerable skiesful of migrating hawks. Hawk Mountain Sanctuary changed the lives not only of dozens of thousands of hawks, but of Conservationist Harwood and the Strikeout King.

8 SILENT HAWAII *by David Wilcove*
Trouble: 1,500 years ago the Polynesians arrived in Hawaii. Trouble: in the 18th century, western settlers arrived in Hawaii. Trouble: perhaps nowhere else on Earth have humans caused a higher proportion of native birds to vanish.

14 ZUM VÖGELN *photographs and text by Tim Fitzharris*
To his dismay, Photographer Fitzharris discovers that linguini, dogs in plaid jackets, and flocks of fluttering underwear are more common in southern Europe than birds.

22 DAY OF THE MIGRATING HEADACHE
by Richard Armstrong and Linda Armstrong
Linda finds bird watching a finch, but after a day in the open air, Rich wouldn't touch it with a 10-foot redpoll.

24 LOOK, MOM, NO CAVITIES *by Danny J. Ingold*
It's another busy day during the breeding season for a pair of red-bellied woodpeckers, and they have finally finished excavating their nest hole. Wait! Two interlopers push their way inside, boot out the woodpeckers, and seize the cavity.

29 THE GEESE, *a poem by Jorie Graham*

30 ON THE FRONT *by Richard E. Bonney, Jr.*
Ecuadorian bird wizard Antonio Torres leads Reporter Bonney and a band of fellow birding press members on an intoxicating tour of the lush, bird-rich, but increasingly troubled land of Ecuador.

34 IN THE FIELD *by Jack Connor*
The bill of a gannet is yellow. Or is it silver-gray? Onetime field guide junkie Connor breaks the habit and draws on the far more satisfying British method of memorizing field marks.

38 THE CATBIRD SEAT *by Pete Dunne*
Our play stars a rubberband held at full draw, a telescope that resembles a locomotive boiler, binoculars with a teeter-totter focusing mechanism, and a brown blur with a head like a marble.

p. 8 To be, or not to be, —that is the 'i'iwi: —

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A Royal Screech

I agree with Pete Dunne ("The Catbird Seat," Autumn 1988) that birders can innocently find themselves not only in difficult, but sometimes humorous, situations. I recall a March evening a couple of years ago when several members of the Weyburn, Saskatchewan, Natural History Society journeyed to Estevan, near the North Dakota border, to look for screech-owls.

We arrived at Estevan River Park shortly before dark. Walking toward an area with many hollow trees, we played our screech-owl tape repeatedly, to no avail. Suddenly a Royal Canadian Mounted Police car pulled up. The officer got out, walked briskly toward us, and in an authoritative voice asked what we were doing.

We told him we were looking for screech-owls, but we could see that he doubted our motives. Then he heard the screech-owl tape and retreated to the sanctuary of his vehicle. Rolling down his window, he listened as one of our members explained the whats and whys of surveying screech-owls.

As he listened, apparently unconvinced, we invited him to turn off his lights and join us. Reluctantly he agreed, saying he would first move his car off the road. He backed up and then, burning rubber, disappeared into the night. We all had a good laugh, commenting that it was the first time any of us had put the Mounted Police on the run. Then, trying to imagine what the officer would tell his colleagues about the encounter, we laughed even harder.

We called in several screech-owls that night and many more in later years, but we'll never forget calling in a policeman.

Raymond A. Belanger
Weyburn, Saskatchewan

Bugged in Sandwich

Your article on selecting binoculars for birding ("Scanning for Optics," Autumn 1988) provided a good guide for bird watchers.

About 10 years ago I researched the market for a set of birding binoculars priced under $500. My criteria were much the same as yours, but my choice was different. I selected Bushnell's 6 × 25 lightweight inverted prisms model and have never regretted the decision. This binocular has been my companion on safari in Africa, through Europe and Australia, and across the United States.

"Just think ... Here we are, the afternoon sun beating down on us, a dead, bloated rhino underfoot, and good friends flying in from all over. ... I tell you, Frank, this is the best of times."

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Why didn't you include this model in your study? It is a shame you did not. I believe you would have found it to be top rated.

John B. Gmeiner
Sandwich, Massachusetts

We received several letters asking why we didn't test certain binoculars. Quite simply, we couldn't possibly test all the binoculars on the market—evaluating just 27 models caused a small mutiny among our testing staff. We tried to select the models that are touted by the binocular companies as the best for birding and that are most commonly used by the birders in our field courses and on our tours.

In this particular case, the 6 × 25 model that Mr. Gmeiner favors is no longer manufactured. And even if it were available we would not have tested it, because we feel that most people require a minimum of 7 power binoculars for successful birding. When Mr. Gmeiner bought his 6 × 25 binoculars 10 years ago, few good lightweight models were available. Now several companies offer them, including Bausch and Lomb (Bushnell), whose 7 × 26 compacts were rated highly in our tests.

Whoops!

I suppose I should be the first to point out that the eggs shown in the photo on page 14 of my article ("Oology: From Hobby to Science," Winter 1989) are not those of the peregrine falcon, as stated in the caption, but are eggs of the brown pelican, probably from Anacapa Island, off California.

In addition, the photo above the misidentified eggs does not show original egg data slips; instead it shows provisional specimen labels that my staff made using the original data slips, which are very different in appearance, intent, and content.

Lloyd Kiff
Director, Western Foundation of Vertebrate Zoology
Los Angeles, California

We sincerely apologize for our errors.

Questionable Globules

The close-up photo on page 33 of the Summer 1988 issue is strikingly beautiful. It shows the waxlike globules of red pigment found on the secondary flight feathers of the cedar waxwing. There is an error in the caption, however, which states that the globules are also found on the Bohemian and Japanese waxwings. In fact, the globules are found on the Bohemian waxwing but not on the Japanese waxwing, despite its name, and despite the fact that several field guides incorrectly show them to be present.

I was reasonably certain of this fact when the photo was published last year, but delayed writing until I could examine some museum specimens. Recently I examined all the skins of Japanese waxwings at the Philadelphia Academy of Natural Sciences. While all the specimens show a pattern of red dots on the wings, the secondaries do not have even vestigial waxlike globules.

I point this out to help remove this incorrect information from the literature.

Larry C. Shelton
Curator of Birds
Houston Zoological Gardens
Houston, Texas

Piping plover. Lang Elliott

Sightings of piping plovers increased in 1988 along the Atlantic Coast for the second consecutive year since the species was designated as threatened. The 1988 estimate was 644 pairs, up from 570 in 1987 and 547 in 1986. The increase is cause for "cautious optimism" about the bird's future, according to Ronald Lambertson, northeast regional director of the U. S. Fish and Wildlife Service. But it remains unclear whether the increase in sightings results from a larger number of birds or more people searching harder for them during the past two years.

Piping plovers are threatened because, like people, they spend their summers on the beach. The bluebird-sized, sand-colored birds nest on open sandy shores above the high-tide line. Eggs are laid in April or May and hatch just as people begin to swarm to the beach. Adult birds frightened from their nests by human activity may stay away for hours, exposing eggs and chicks to the weather and to predators such as dogs, cats, gulls, foxes, and raccoons. Some nests are also destroyed each year by unusually high tides.

Still, the birds can survive if they receive protection. At Chincoteague National Wildlife Refuge in Virginia, for example, only three chicks were reared to flight age in 1987. When the plovers' favorite nesting sites were protected from human disturbance in 1988, 26 chicks survived to flight age.

This is the second time within a century that piping plovers have been brought near extinction. Decades of spring and autumn shooting had decimated the species by the 1890s. When shooting was outlawed populations recovered, only to face the new threat of escalating beach use following World War II. Several years of population studies will be needed before researchers can tell if population gains are real and if the plover can sustain its numbers in the face of human competition.

Louisiana is home to a brand-new national wildlife refuge and will soon add another. In March 1989, the 9,600-acre Cameron Prairie in Cameron Parish became the nation's 447th refuge. This refuge, all prime waterfowl habitat, is located about 15 miles southeast of Lake Charles. Also, Lake Ophelia National Wildlife Refuge, a 30,000-acre expanse of bottomland hardwood swamp in Avoyelles Parish, will soon become the system's 448th unit. Located about 30 miles southeast of Alexandria, Louisiana, this refuge will provide wintering habitat for an anticipated 100,000 mallards, pintails, and other ducks.

Andean condors living along the coast of Peru have developed an unusual breeding strategy to take advantage of El Niño, a periodic oceanic phenomenon that wreaks havoc among many populations of sea and land animals. Research by Michael Wallace and Stanley Temple of the University of Wisconsin indicates that the carrion-consuming coastal condors breed only in the years when El Niño produces a food glut of carcasses.

The effect of El Niño, an influx of warm water masses into the cold seas off the coast of northern Peru and Ecuador, is usually mild. About once every five years, though, the phenomenon seriously disrupts the entire food chain. In the nutrient-poor warm water, plankton reproduction slows, and fish and other planktivores starve. So do vast numbers of marine mammals and seabirds, which die and wash on shore. At the same time, heavy rains on land lead to disease, parasite infestations, and death of livestock.

In normal El Niño years, the researchers found little evidence of condor breeding. After the major El Niño in 1982–83 served up a feast of carrion, however, all of the condors they surveyed in the Andean foothills were tending juvenile birds — indisputable evidence that breeding had occurred. By contrast, Andean condors living at high elevations, where the food supply tends to be constant, breed regularly every other year.

Coastal Andean condors have the lowest natural breeding rate of any bird, one that is tied to an irregularly occurring natural event. Ironically, the absence of a catastrophe could put the population at risk.

Conservationists in the African nation of Zaïre are building a field library to help train Zaïrean field biologists. Zaïre, a country the size of the United States east of the Mississippi that contains one of the world's largest tracts of tropical rainforest, has barely a handful of biologists to deal with conservation issues. Educational materials are desperately needed. Readers are encouraged to send relevant natural history books and texts in biology, ecology, and the environmental sciences to the editor of *The Living Bird Quarterly,* who will arrange their shipment to Zaïre.

Migrating bald eagles were hit by cars and trucks as they fed on road-killed deer along the Swan Valley Highway in Montana last winter. At least six eagles were killed and motorists reported that 22 more were struck but flew away — probably to die in roadside ditches. Rehabilitator Ken Wolff, director of the Grounded Eagle Foundation, fears that many more eagle deaths and injuries have gone unreported.

The problem has existed for years, but seems to be getting worse. One reason may be that more eagles are migrating through the Swan Valley. The salmon fishery in Glacier Park, their traditional feeding ground, has been disrupted and the birds have dispersed throughout the northwest corner of the state, looking for other sources of food. Road-killed deer make an acceptable — and plentiful — salmon substitute. The deer population has been growing after recent mild winters, and the more deer in the woods, the more deer on the roads.

Wolff is trying to divert the birds to a "bone pile" of deer carcasses he has piled safely away from the highway. About 200 eagles were sighted feeding there this past winter, but more must be done to protect the over 1,000 eagles that pass through Montana.

Wolff hopes to convince the state highway department, which is already helping the situation by promptly removing carcasses, to put up more signs warning motorists. He is also trying to set up a network of volunteers who will collect deer road kills to make other bone piles away from traffic along the Swan River.

Says Wolff, "It's a pretty inglorious way for our national emblem to die."

The Spectacle at Hawk Mountain

Whenever he's at Hawk Mountain Sanctuary, my young friend the Strikeout King seems to be a magnet for migrating golden eagles. Beginning with his very first visit to the place in early November a few years ago, he has had the good luck to see some of the best golden eagle days in the history of the sanctuary — the sort of nature show that made the place famous. To him it's a slow November weekend when fewer than 10 eagles fly by along eastern Pennsylvania's Kittatinny Ridge, in company with hundreds of red-tailed hawks and dozens of red-shouldered hawks.

I like to watch this teenager watch raptors. Normally he's a fairly calm fellow, even when he's slipping an 80-mile-an-hour third strike over the outside edge of the plate. But when the day's first bird of prey sails toward a hawk lookout, the Strikeout King's adrenaline starts to flow, and he's suddenly all exclamations and arms pointing excitedly.

I wonder if Hawk Mountain will change his life — maybe it already has — the way it has changed the lives of so many other people. Mine, for one. The mountain affected me so powerfully from the time I first visited it I made it the centerpiece of my first book about our environment and co-planetarians. So it was a crossroads in my professional career. Just as important, when I was doing the research for that book I sometimes helped take the formal counts of migrant hawks over the sanctuary, which inspired in me the notion that I and other amateur bird watchers could contribute in meaningful ways to scientific knowledge. That wasn't an original idea, but I had not given it much thought before; once I thought about it, I began to act on it. Again, my life was changed dramatically and forever.

Hawk Mountain became a sanctuary in the summer of 1934. Until then it had been a place where hunters shot hundreds or thousands of migrating raptors every fall. Hawk shooting was legal in those days. It was considered a good American sport and was widely justified, even by some conservationists, on the grounds that hawks and owls killed small birds and game, hence were not worthy of the protection that titmice or warblers deserved. That was nonsense, of course — a narrow-minded attitude based on ignorance of even the most fundamental facts about raptors and ecology.

Hawk Mountain was particularly favored by Nature for hawk shooting. It lies on the Kittatinny Ridge, easternmost ridge of the Appalachians, which runs west-southwest more or less unbroken from New York State to the Maryland border (Kittatinny means "endless mountain" in Lenape). In certain weather conditions in the fall (but not in spring) thousands of migrant hawks pile up along the ridge, riding the air currents for mile after mile like surfers on a wave. When the ridge reaches Hawk Mountain it zigs and then zags and pops out sandstone knobs that made first-rate shooting stands.

News about this shooting eventually spread to the conservation community. A small group of northeastern conservationists, headed by Rosalie Edge of New York (a formidable lady described by a contemporary as "the only honest, unselfish, indomitable hellcat in the history of conservation"), leased and then bought Hawk Mountain, declared it a sanctuary — the first in the world to protect raptors — and hired a warden to spend autumns there and keep out the gunners. The warden, 28 years old when he first showed up at the sanctuary (he retired as the man in charge 32 years later), was a slim, intense, energetic refuge manager named Maurice Broun. He had had no formal education in natural science, but he was a first-rate amateur naturalist, and once he was on the scene he began studying the raptor migration and counting the passing birds. Ornithologists were already aware that many raptors did migrate, but few details about the phenomenon had been collected. Broun opened a lot of eyes with his observations of the numbers of raptors that passed Hawk Mountain — many thousands in a season — and the timing of the migrations of different species. Even some of the species involved were a surprise.

For example, the golden ea-

Courtesy Hawk Mountain Sanctuary (3)

gle that the Strikeout King finds so common at Hawk Mountain in late fall was generally believed to be *extinct* in the Northeast before Maurice Broun began taking counts. The first year he saw 39.

This spectacle of raptor migration attracted bird watchers to the mountain—at first by twos and threes, eventually by hundreds and thousands. They came from all over North America, all over the world, and many left as proselytes. Filled with dramatic images of raptors and the raptor-conservation message delivered on the mountain by Broun and others, they returned home to discover local hawk-watching sites and to campaign for raptor protection. Hawk shooting was eventually outlawed in North America, and across the country a network of hawk watches developed to broaden greatly the picture of migration that had been seen first through the lens of Hawk Mountain.

In the beginning, Maurice Broun and his wife Irma were posted at the sanctuary only during the fall; the protection of migrant hawks was Hawk Mountain's sole mission. They boarded in a nearby village because the original real estate didn't include a house. But the sanctuary grew in size and outlook. Financed by membership dues and admission fees and gifts, facilities were bought and built, and Hawk Mountain began to develop a year-round program of conservation education concerning much more than migrating birds of prey.

These days the Hawk Mountain Sanctuary Association, represented by a board of directors and a full-time staff of 10, manages some 2,200 acres of land, five major buildings, and a dozen outbuildings. The sanctuary has 7,700 members and is visited by 48,000 people a year. Thousands of school children are given lessons in ecology on the mountain and in their classrooms. The sanctuary also offers courses for college credit and other educational programs in a wide range of subjects—from raptor biology and geology to wildlife art. Each year 10 or so college-age students from North America and overseas serve as interns at the sanctuary in education, research, conservation, and sanctuary management, and then carry their Hawk Mountain experiences far and wide. The sanctuary and its staff members participate in national and international conservation projects, particularly those having to do with raptors. Research in field biology, such as radio tracking migrant hawks, has become an important part of the program as well.

This continuing expansion in part reflects the growth of the whole conservation movement in the latter half of the 20th century, but it is based on something far more fundamental than a movement. Its cornerstone is personal connection—the sum of a great number of individual personal connections, actually—to a spectacle.

The shooting of bald eagles was fair game on Hawk Mountain (top left) until conservationist Rosalie Edge (left) founded Hawk Mountain Sanctuary in 1934 and hired the then 28-year-old Maurice Broun (above) as warden.

As the Strikeout King puts it, raptors are "dominating" in appearance and behavior. They are birds of heroic scale and regal pace, attracting and often permitting lengthy observation as they pass the mountain. For many people, I think, the spectacle of the raptors' passage is a doorway to a reality much larger and deeper than the one in which we humans normally operate. The spectacle changes perspectives and attitudes—and individual lives. In favorable weather, one sits as if on an island, looking out into a river of hawks, falcons, and eagles flowing hundreds of feet above the valley floors on either side.

I asked the Strikeout King recently about his impressions. "Hawk Mountain is *made* to show off these birds," he said. "You can relate to how high they are, and it gives you the perception of being a bird of prey yourself for small instants of time." If we are to go on revolutionizing the way our species treats the planet, we will require, on a regular basis, such jarring glimpses into life dimensions outside our own.

—**Michael Harwood**

SILENT HAWAII

David Wilcove

The view from my apartment on the outskirts of Washington, D.C., is hardly inspiring: a cluster of condos, a vacant lot overgrown with shrubs and saplings, a backyard. Yet on any given morning I can count on seeing and hearing birds — not just non-native and unwelcome species like house sparrows and starlings, but native ones, too: Carolina wrens, downy woodpeckers, catbirds, Carolina chickadees, cardinals, blue jays. Their presence is a reminder that, even after three centuries of abuse, our avifauna is still remarkably intact. This is not to say that birds are as abundant as they once were, for they assuredly are not, or that we have not witnessed extinctions among them. But somehow the overwhelming majority of bird species have managed to survive the relentless industrial and agricultural development of the United States. Except in Hawaii.

Hawaii's backyards, city parks, and lush lowland forests may be filled with birds, but they are not native birds. All were brought to the islands by people who have turned much of the archipelago into a zoo without bars. For example, one August afternoon in 1987, a friend and I surveyed the birds in a weedy field on the Big Island of Hawaii. Our tally: saffron finches from South America, yellow-fronted canaries and warbling silverbills from Africa, ricebirds and spotted doves from southeast Asia, and house finches from North America. Not a single native species.

To find the native birds, one must travel to those scraps of land that time forgot — forested slopes too steep for farming or ranching, inaccessible plateaus, and places so cold, wet, and miserable that no one wanted to settle them. Here, in the interstices of human occupation, Hawaii's native birds are making their last stand in a battle they have been losing for centuries.

The trouble began with the arrival of Polynesian settlers some 1,500 years ago. By clearing forests for agriculture and introducing rats, dogs, and pigs to the islands, the Polynesians exterminated over half of the endemic Hawaiian land birds. Among their victims were two species of flightless ibises, eight species of geese, seven rails, three owls, and no less than 18 species of honeycreepers.

Western settlers, arriving in 1778, cleared more forests and introduced goats, cattle, mongooses, more pigs, more rats, and other mammals. The settlers also brought with them exotic birds infected with avian malaria and avian pox — diseases to which the native birds were very susceptible — as well as mosquitoes that spread these maladies. The result was a second wave of exterminations, leading to the loss of 13 more species and major population reductions in others. At least two-thirds of Hawaii's endemic land birds are gone. Humans have caused a higher proportion of native birds to vanish on Hawaii than perhaps anywhere else on Earth.

The numbers are depressing, but no amount of remorse will bring these extinct birds back to life. The real tragedy is that the extinction process grinds on, that over half of the remaining land birds may disappear in the coming decades, and that this wave of extinction is taking place under the watchful eyes of the U.S. Fish and Wildlife Service (USFWS), the state of Hawaii, and private conservation organizations. It's not that people and government agencies aren't concerned; it's that never before have conservationists confronted so many problems — so many expensive problems — with so little time to solve them.

Consider the status of eight of the rarest birds: two species, the Kauai 'akialoa and Molokai creeper, have not been seen in over two decades and may be extinct; the Kauai 'o'o may be down to a single individual, last sighted in 1987 in the heart of the Alakai wilderness. Populations of three other birds in the Alakai Swamp — the kama'o (a thrush closely related to the Townsend's solitaire), 'o'u, and nukupu'u — are so low that extinction is probably imminent. Extensive surveys in 1988 on Molokai turned up only one sighting of the island's endemic thrush, the oloma'o; and the Hawaiian crow is down to a couple of individuals in the wild and nine in captivity.

Although all of these species have been declining for decades, perhaps centuries, the past 20 years have been among the worst of times. For example, 76 Hawaiian crows were thought to exist in the wild in 1978; in 1985 only 10 individuals could be located. Now two or three birds remain. Logging operations in the center of the crow's range, illegal shooting, and the spread of avian diseases are the prime culprits. Or consider the birds of Kauai: as recently as 1960, biol-

JEFFREY BLAUFARB

The fecund forests of Hawaii, once filled with fascinating native birds, are now silent or fraught with unwelcome imports. To find endemic species today, one must travel to those scraps of land that time forgot. In these last interstices of human occupation, Hawaii's indigenous birds make their last stand in a battle they have been losing for centuries.

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Detail of a painting by H. Douglas Pratt. Courtesy Bishop Museum, Honolulu, Hawaii.

GONE BUT FORGOTTEN

How many birds occurred on Hawaii before humans arrived? Until very recently, most ornithologists assumed that the Hawaiian avifauna was essentially intact until some time after 1778, when Captain James Cook opened the South Pacific to white settlement. Museum specimens confirm the existence of about 50 species of endemic Hawaiian land birds (this tally excludes pelagic birds such as shearwaters, terns, boobies, and frigatebirds). Hence the story that has been published in countless articles and books—two centuries ago Hawaii had about 50 land bird species. Then white settlers arrived and caused the extinctions of at least a third of the region's avifauna by destroying habitat and introducing exotic diseases and predators.

But now we know this story is incorrect. In the early 1970s, Storrs Olson of the Smithsonian Institution and his co-workers began exploring sinkholes, caverns, aeolian sand dunes, and lava tubes in the Hawaiian islands. These researchers were searching for fossil bones, and what they found was nothing short of astounding. They unearthed the remains of at least 44 species of birds that became extinct before any ornithologist could observe them. Among these are many genera of birds that were never thought to have occurred in Hawaii—three species of flightless ibises, an eagle closely related to the bald eagle, an Accipiter hawk, three species of long-legged owls, plus an assortment of novel honeycreepers. And the list goes on. With the revelations unearthed by Olson and company, the old story needs serious revision, for it now appears that half of Hawaii's endemic land birds vanished before Captain Cook's arrival — and this number is sure to grow as Olson and colleagues continue to explore the Hawaiian archipelago.

What would account for the massive extinction of birds as diverse as flightless ibises, eagles, crows, and honeycreepers? Pleistocene climate changes? Not likely, since radiocarbon dating of snail shells and crab claws found mixed with the fossil bird bones shows that all of these animals survived beyond the Pleistocene.

The answer might lie with the Polynesians, who colonized Hawaii about 1,500 years ago. We know that many of the fossil birds occurred contemporaneously with the Polynesians. Bones of the now-extinct birds have been found with those of chickens, dogs, and Pacific rats—animals that were brought to the islands by Polynesian settlers. And some of these bones have been found in Polynesian refuse piles, suggesting that more than one flightless ibis or goose wound up in a hungry person's stomach.

All these birds vanished after the arrival of the Polynesians but before that of Captain Cook. The case against the Polynesians, therefore, seems to have been proven beyond a reasonable doubt. But how did these people kill off so many species?

Olson suggests a number of possibilities. Some of the larger, flightless species may have been hunted to extinction. Populations of other birds were undoubtably harmed by the dogs, rats, and pigs that accompanied the Polynesians when they migrated to Hawaii. As for the small forest birds, the likeliest cause of extinction, then as now, was loss of habitat. For agricultural purposes, the Polynesians cleared most of the dry, lowland forests, which probably were the prime habitat for many of the now-extinct birds.

The birds are just the tip of the iceberg. We may confidently assume that these same forests contained even larger numbers of endemic plants and insects. But since the soft, boneless bodies of plants and insects rarely become fossils, we will never know the full range of species that once inhabited the Hawaiian islands. — D. W.

ogists recorded a dozen Kauai 'o'o in the Alakai Swamp. At that time, the kama'o probably numbered in the hundreds. Although the rainforests of the Alakai are essentially unchanged, bird populations have crashed, suggesting that some disease is responsible.

The loss of any species diminishes the splendor of the world, but when the loss occurs before our eyes, it becomes especially painful. If I were asked to pick one species to exemplify the ecological devastation we have inflicted upon Hawaii, I would choose the po'ouli.

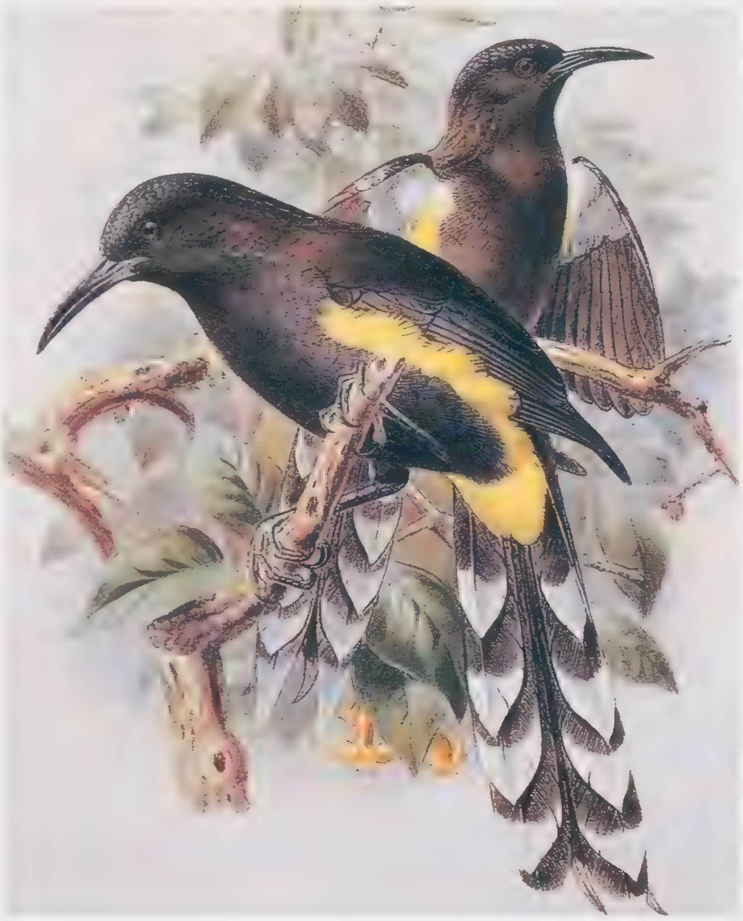
A little brown honeycreeper with a dapper black mask, the po'ouli was not discovered by scientists until 1973. It inhabits less than 1,000 acres of dense rainforest on the northeast slope of Haleakala crater on the island of Maui. Between 1975 and 1980, it may have declined by as much as 85 percent as feral pigs destroyed the shrubs and small trees in which it forages. The digs and wallows of pigs also create temporary pools of water in which disease-laden mosquitoes breed. The po'ouli may disappear before the end of the century, a species whose discovery will have coincided almost precisely with its extinction.

Paradoxically, these declines are occurring at a time when support for conservation in Hawaii is growing. From 1976 to 1983, biologists from the USFWS and the Hawaii Department of Land and Natural Resources undertook a statewide survey of forest birds. The survey was science at its romantic and masochistic best. Field teams slogged through miles of some of the wettest, muddiest, and most inhospitable terrain on earth. About one-third of the land they surveyed had never been explored by ornithologists. The result was invaluable data on the location, abundance, and behavior of forest birds on Kauai, Maui, Molokai, and Hawaii.

With this information, scientists were able to find the key unprotected areas that harbored populations of rare native birds. Six preserves have been established by the state of Hawaii, the federal government, and The Nature Conservancy since 1981. Support from philanthropic organizations such as the MacArthur Foundation has enabled the Conservancy to expand its land protection efforts in Hawaii and allowed national environmental groups including the National Audubon Society, Natural Resources Defense Council (NRDC), and Sierra Club Legal Defense Fund to open offices in the state. Both national parks, Hawaii Volcanoes and Haleakala, have stepped up efforts to control goats, pigs, and other alien species that threaten the native flora and fauna.

Negligence is no longer the issue. To say that state and federal agencies or private organizations are unaware of the problems in Hawaii or unwilling to address them would be inaccurate and unfair. But whether they can muster the money and staff to do the job is another matter. Preserving the Hawaiian avifauna will require expensive, intensive management. The quick and easy solutions disappeared long ago. An example (one never lacks examples in Hawaii) is the Hakalau Forest National Wildlife Refuge on the Big Island of Hawaii, a recent addition to the state's roster of protected places.

Hakalau is not open to the public, and even if it were, few people would want to visit it. Formerly a cattle ranch, the refuge consists mostly of grassy pastures and scattered groves of ancient koa and 'ohi'a trees. The weather is capricious — sometimes warm and sunny but more often cold and wet. Trails and shelters are nonexistent. Still, to any ornithologist, Hakalau is a magical place.



Among the species that have vanished from Hawaii is the Oahu o'o (left). This bird, like most natives, fell victim to forest clearing and exotic predators and diseases all brought to the glorious islands by Western settlers in the late 1700s. At least two-thirds of Hawaii's original bird species are considered extinct, and the relentless process grinds on.

Right: lithograph by J. G. Keulemans. Courtesy the Hon. Dr. Miriam Rothschild.

No other national wildlife refuge harbors more endangered bird species (four, maybe five). And nowhere else in Hawaii are the native birds as conspicuous and abundant. In 25 years of bird watching, I count among my favorite days those I've spent at Hakalau — finding the little flocks of honeycreepers, watching them forage and sing and chase each other from tree to tree, and reveling in their limitless supply of kinetic energy. Bright red 'i'iwis probed the blossoms of 'ohi'a trees with their pink, decurved bills. Moving through the foliage were 'amakihis and Hawaii creepers — small green birds intent on ferreting out whatever insects they could find.

On one memorable occasion, my ears picked up a gentle tapping sound emanating from a giant koa tree. Since no woodpeckers occur in the Hawaiian islands, the sound could belong to only the 'akiapola'au. This honeycreeper is perhaps the most remarkable of all Hawaiian birds, for it sports a dual-purpose bill — a long, decurved upper mandible for probing and picking, and a straight, stout lower mandible which it uses to chisel wood. I traced the tapping sound to its source, and found myself looking at a six-inch, bull-

D. CAVAGNARO (2)

headed, yellow bird. The 'akiapola'au hopped along a dead limb of the koa tree and paused. It opened its beak and began to pound the branch with its lower mandible. Its little body rocked back and forth as it delivered blow upon blow. A downy woodpecker would be proud of this bird, I mused, as the 'akiapola'au finally extracted a fat grub.

My joy in Hakalau was tempered by the realization that its birds still face an uncertain future. Feral pigs roam the refuge, destroying native plants. The state of Hawaii insists that a strip of state-owned land in the middle of Hakalau be managed to provide surplus pigs for hunting (pigs are notoriously bad about respecting property boundaries). Cattle are still permitted on parts of the refuge, and must be carefully managed to ensure they do not get into places they do not belong.

Hakalau's biggest enemy, however, is time. After years of management as a cattle ranch, much of Hakalau is covered with a thick blanket of grass which prevents the growth of koa and 'ohi'a trees. Meanwhile, the ancient trees that form the forest—and are critical to the survival of the birds—are dying of old age. Unless regeneration can be stimulated, Hakalau eventually will lose its big trees, and consequently, its birds. There is also a time lag to consider. Because koa and 'ohi'a are very slow-growing trees, they do not develop cavities and large, dead limbs until they are very old. Unfortunately, the 'akiapola'au forages on dead, moss-covered limbs and the 'akepa, another honeycreeper, nests in cavities. Hence, even if regeneration were achieved overnight, it would take many years before the new trees could provide suitable habitat for these two species.

Essence of Bird in 12 Letters

In English, a bird's common name usually describes its most notable characteristic. Checklists are overpopulated with bird names like rose-breasted grosbeak and yellow-bellied sapsucker. The flycatcher catches flies, and the catbird's call is definitely feline.

To those who don't speak Hawaiian, however, the common names of endemic Hawaiian birds may sound like melodious but meaningless sequences of repeated syllables: alala, 'o'o, nukupu'u. The reason the names sound lovely and alliterative is because Hawaii's written language comprises only 12 letters, so a good deal of repetition is inevitable. Still, Hawaiian bird names—like their English counterparts—capture the essence of a bird.

According to H. W. Henshaw, whose book, *Birds of the Hawaiian Islands*, was published in 1902, Hawaiian bird names often imitate a song or call. A good example is one small, active flycatcher whose song is usually reported as "e-le-PAI-o." It's not surprising that the elepaio is named for its song; the bird repeats it over and over. The 'o'o, a honeyeater, probably also takes its name from its call, a double note variously described as "chook-chook," "took-took," or "oh-oh."

A bird's name may describe its call rather than imitate it. The chipping call of the Molokai creeper is said to sound like someone chopping wood, and the Hawaiian name of this bright scarlet bird is kakawahie: *kaka*, to chop, and *wahie*, firewood.

Some honeycreepers take their Hawaiian names from their unusual bills. *Loa* means "long," and the akialoa, a large honeycreeper, has an extra-long bill. Nukupu'u means "hunched beak," a poetic description of this bird's long, curved upper mandible and very much shorter lower mandible.

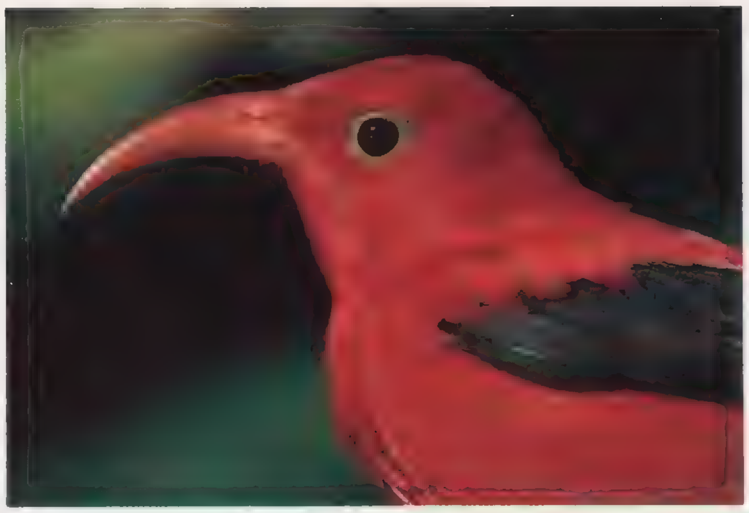
Another honeycreeper, the po'ouli, has a short, thick, and altogether undistinguished beak, but its black mask is distinctive. Its name reflects this—*po'o* means "head," and *uli* means "dark-colored." And yet another honeycreeper, the akepa, is named not for its appearance, but for its behavior: the word means quick, nimble, sprightly.

Mary Kawena Pukui and Samuel Elbert's authoritative Hawaiian dictionary gives some interesting bird-based idioms. One that will seem familiar when translated into English is the phrase *he alala, he manu leo nui* (literally, a crow, a bird of much talk). This has come to mean "a talkative person." Another example is the use of the term *elepaio* to mean someone who "craves fish but does not go fishing." This usage arose because, to a native speaker of Hawaiian, the elepaio's call sounds like the words, "fish is delicious, fish is delicious." While there would seem to be somewhat limited opportunities to call someone an elepaio these days, it's certainly a kinder and gentler bird-based expression than "turkey," "booby," or "cuckoo."—C. B.

According to the NRDC, Hakalau Refuge must face these problems with a budget of only $160,000 for the 1989 fiscal year. With this money, the refuge has been able to hire a supervisor and provide him with an office (located two hours away from the refuge) and a vehicle. A temporary employee will be stationed at the refuge to supervise the construction of fences to control inroads by pigs and cattle. A pilot study of reforestation methods is planned, as well as a better management plan for the cattle that are still permitted in the refuge. In the absence of adequate funding to control non-native plants, the refuge intends to rely on cattle grazing to curb the growth of the grass. (This is a catch-22, however, because the cattle will also eat young koa trees.)

NRDC estimates that the refuge needs about $3.0 million for the next fiscal year—an 1,800 percent increase over current funding levels. With this additional money, the refuge staff could build 60 to 70 miles of fences to manage pigs and cattle, control non-native plants, and place sufficient permanent staff at the refuge to supervise grazing activities, maintain the fences, and plant native tree species in abandoned pastures.

With Hakalau, as with the other preserves in Hawaii, it boils down to a lack of money. No villains, really, just too little money in an era of budget deficits. I would like to believe that a conservation-minded public will soon realize just how special Hawaii is, how tens of millions of years of splendid isolation have crafted a flora and fauna of unmatched scientific value, and how less than two thousand years of human occupation have almost annihilated it. I would also like to believe that once people understand what is at stake, they will insist that the money be found.



JAAN LEPSON (2)

Biologists from state, federal, and private agencies are trying to slow habitat destruction and ecological disaster through a number of management techniques. If successful, some Hawaiian birds may continue to survive, such as the 'i'iwi (above left) which uses its decurved beak to probe the blossoms of 'ohi'a trees (far left), and the 'akiapola'au (left), one of the honeycreepers that pollinates the endemic hibiscadelphus (below).

But the isolation that has allowed so many remarkable species to evolve on Hawaii works against it with respect to conservation. Relatively few Americans have visited Hawaii, and its birds enjoy none of the popular support that surrounds mainland species like the California condor and whooping crane. When a baby condor was born in captivity in San Diego last year, it was a national news story. Yet how many people heard about the baby Hawaiian crow that was also born in captivity last year — even though there are three condors alive for every Hawaiian crow?

In an article published almost exactly one hundred years ago, ornithologist Scott Wilson made the following prediction:

> It would be a disgraceful thing if such a Garden of Eden should be bereft of its birds. . . . Several species of Hawaiian birds, which were to be found in Cook's time, and others which were obtained even so late as 1840, have become extinct, and it would not be rash to say that ere another century has elapsed but few native species will remain.

Given Hawaii's history, one wonders how many native birds will be left in the year 2090. □

David S. Wilcove is senior ecologist at The Wilderness Society in Washington, D.C. He also serves on the boards of directors of the United States and Pan-American sections of the International Council for Bird Preservation.

Further Reading

Culliney, John L. *Islands in a Far Sea: Nature and Man in Hawaii.* San Francisco: Sierra Club Books, 1988.

For further information about conservation issues in Hawaii, please write to Dr. Faith Campbell, Natural Resources Defense Council, 1350 New York Avenue, NW, Washington, D.C. 20005.

Greater flamingos, the Camargue, France

ZUM VÖGELN

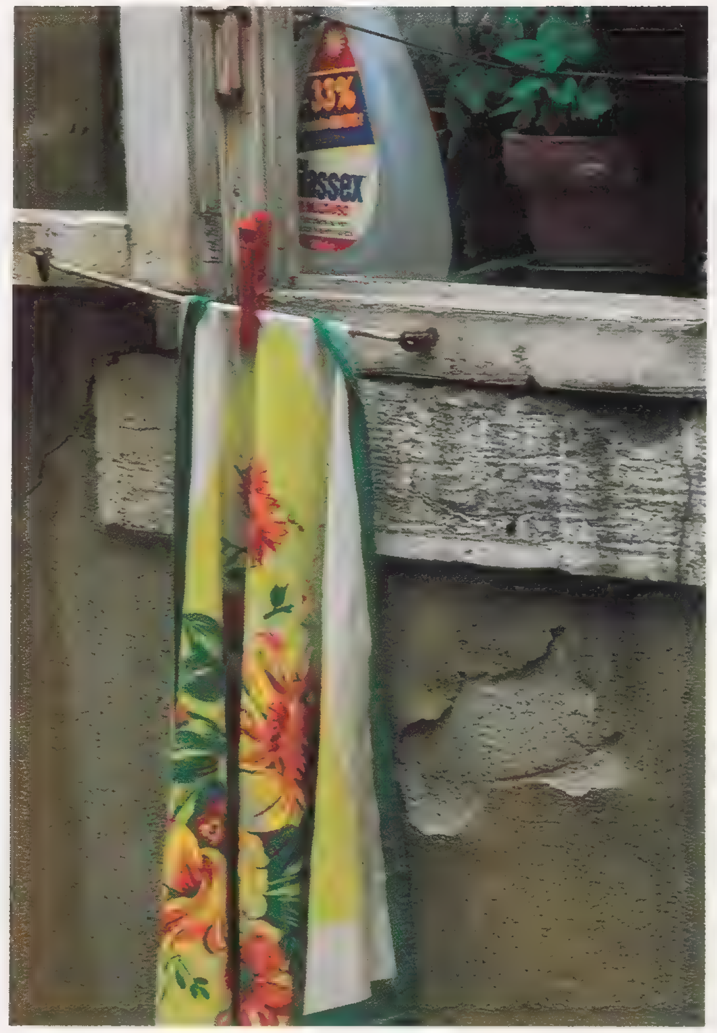
Photographs and Text by Tim Fitzharris

As the Mediterranean sun climbed higher, it quieted the flamingos. One by one they took a single-legged stance with necks collapsed across their backs. From time to time a bird unfolded, scanned the surroundings, then retracted into a pink bundle. The flock slept.

Since sunrise, I had been photographing flamingos from a floating blind. Working in a blind is like being invisible, at least when you are among birds. It's a great sensation even if the quarters are cramped and soggy. Now I was hungry, and this seemed like a good time to quit. I took a last look about the marsh through the telephoto lens, stopping to focus on a small, hand-printed sign on the shore . . . DANGER—TOROS DE COMBAT!

For three days I had been taking pictures in the Camargue, a region of saltwater beaches, dunes, brackish lagoons, and freshwater marshes at the delta of the Rhône River in southern France. It is one of the last undeveloped coastal areas in the Mediterranean. Its wetlands provide nesting habitat for greater flamingos, European oystercatchers, avocets, little bitterns, and great reed warblers, to name only a few. Among the migrants that stop to feed and rest in the Camargue are ruffs, curlew and sometimes broad-billed sandpipers, little stints, whimbrels, and greenshanks. During the winter there are large concentrations of waterfowl.

The sign that filled my viewfinder referred to the bulls that run wild in the marshes. At round-up time the local cowboys sort the bulls into two groups: the docile animals are directed into chutes marked "filet mignon," and the hot-nostriled ones are herded into trucks bound for the bull ring. Not excited about testing the élan of southern France's livestock, I decided to clear out before one of the fighting bulls caught wind of me, a decision made easier by my empty stomach and the Arlesian sausage, baguettes, and bottles of Côtes du Rhône that waited back at my hotel in the seaside town of Les Saintes Maries de la Mer. My sudden appearance outside the blind forced the sleeping flamingos into flight. They made a running take-off, the crimson wings unfurling, flashing like red strobe lights. Heads and necks stretched into the wind as their reedy legs kicked against the marsh. From the



I was tired of looking for birds and started to photograph laundry.

tangle of limbs and water, the birds suddenly gained buoyancy and grace, and soon were lost in the distant haze.

In between my early morning and evening shooting sessions, I had time to enjoy the activity in Les Saintes Maries de la Mer, a small resort with broad beaches, a big carousel, and many cafés. A lot of the dogs there wear scarves or plaid jackets. Most of them run loose about the narrow streets, visiting garbage cans, butcher shops, cats, and other dogs. They are well behaved and have names like Jocko and Pitou. After a morning shoot I usually had petit déjeuner at a sidewalk café near the bull ring. Between mouthfuls of pastry and café au lait, I tossed croissant scraps to the passing dogs, read the local paper, and added up the number of birds I had photographed that day. Afternoons I wandered down to the square to watch the gypsies and get my palm read.

The gypsies spoke in a heavy dialect that I couldn't understand, but it was worth a few francs just to have my hand held by one of those strong, dark women. One day I rented one of the Camargue's famous ponies for a ride into the marshes. My mount, Crevin, was touted as "un animal très compliant," a quality that seemed quite appealing. I soon learned the English translation — "a horse that gives a rough ride with plenty of unscheduled stops for eating grass."

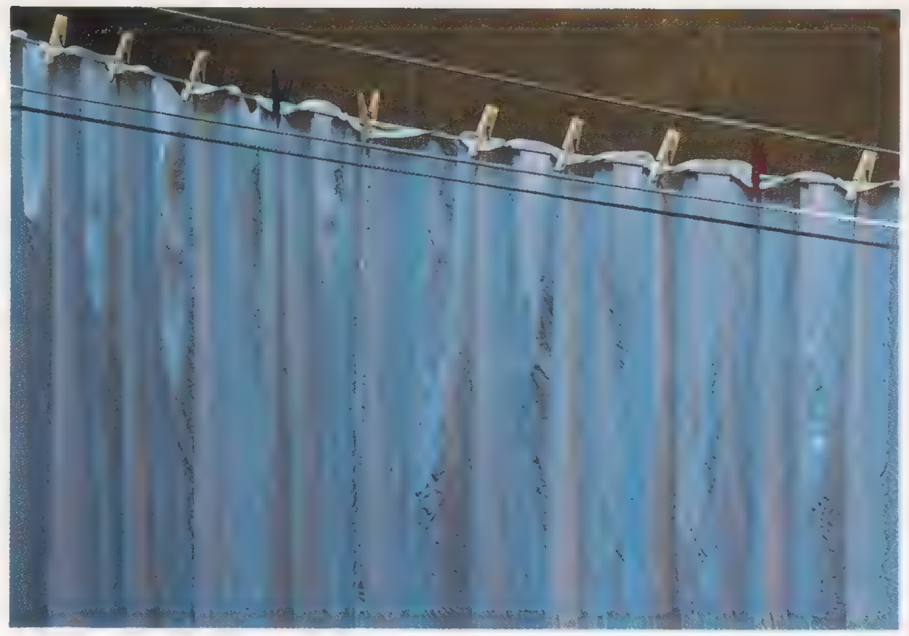
The Camargue is known for its aquatic birds. In addition to greater flamingos I had been on the lookout for squacco herons, purple herons, cattle egrets, little bitterns, spotted redshanks, Kentish plovers, and red-crested pochards. Before leaving home I had suspected that bird photography was going to be difficult in southern Europe. There is little natural habitat, and what remains is strictly regulated by the government; the best areas are usually off limits to photographers, especially during the nesting season when human activity is most likely to cause disturbance.

A few days after the encounter with Crevin, I was back on the Étang du Vaccarès (my favorite marsh for photography) as the sun came up behind the flamingos. I had spent an hour stalking a black-winged stilt. Now it was frozen in my lens, immobilized by a Montague's harrier that hung in the wind overhead. As the hawk floated away, the stilt grew more animated. *Kyik kyik kyik kyik* it cried, complaining momentarily about the strange structure (my blind) that had invaded its nesting territory.

With the stilt were three chicks, whose camouflaged down made them nearly invisible to passing hawks. These fuzzballs walked about the mudflats fearlessly, and tired quickly. When mother stopped and lowered herself on long, folded legs, two of the chicks stepped up onto a flexed leg as if it were a perching rail. The third young stretched upward and embedded itself in the down beneath its parent's wing. I shot frame after frame of the family feeding and cozying up to one another — my last blast at the Camargue before heading into Italy.

I was sad to leave the Camargue with so many birds yet to discover and photograph, so many crêpes untasted, so much beach untested. But with the approach of summer the breeding season was quickly winding down; birds would be getting harder to find and I still had a lot of territory to cover.

I drove east, following the Mediterranean coast across France along the Côte d'Azur. Roasting comfortably in the sun, the road snaked around coves and steep cliffs. The beaches were walled in by parasols, cabanas, restrooms, and cafés; no chance for a bird-choked salt marsh anywhere. By the time I reached the Italian border, I was tired of looking for birds (I had seen few) and started to photograph laundry. In every town — San Remo, Imperia, Savona — clothes



drooped from iron balconies and lines strung between apartment buildings. It struck me that laundry was not unbirdlike: it was colorful, lone specimens hung here and there, but it usually gathered in flocks, swooping and fluttering against the sea breezes. I decided that my favorite species was the Italian undershirt.

My guide to photographing birds in Europe by Mike Hill and Gordon Lansbury made a big deal out of the Punte Alberte Wildlife Oasis on the Po River delta 35 miles south of Venice. The book said it was a site of international importance, managed by the Italian World Wildlife Fund. That was enough for me. I aimed my rented Fiat toward the spot after picking up a half dozen pannini con Genova salami and a couple of bottles of Moretti la Rosa, the finest beer in the world. In between laundry photography I did some serious driving. I stuck to the side roads and overtook every vehicle possible, when necessary creating a new passing lane right down the center stripe, an exciting practice that seemed common in Italy.

I spent the next day looking for the wildlife oasis—without luck. Few people spoke English and the ones who did had not heard of the Punte Alberte. The delta itself was diked and drained and planted with rice and other crops. All I saw was a thin assortment of gulls, a few gray herons and little egrets, a black-crowned night-heron, and a small flock of cattle egrets. Except for the stops for chocolate gelatos, I might as well have gone to Ohio.

I grew discouraged. Trying to throw off despondency, I gathered field guides and road maps and entered the Ristorante Petrini on the outskirts of Catarina, a small town on the Po. As I ate and drank and studied, industry moved past the open window — trucks and motorcycles, dust and flashing lights, a tireless static without birds. Maps spread over the table, I weighed the alternatives amid a thickening cloud of diesel fumes and depression.

My final destination would be the Neusiedler See in eastern Austria. I circled it with a strand of linguine soaked in olive oil, garlic, and crushed anchovies. It was home for Mother Goose's stork (the white stork). On the way I planned to visit Venice, once an expanse of salt marsh teeming with wading birds and waterfowl where, on weekends, wealthy Romans came up in their chariots to hunt. I was curious to see how the birds had fared since the city's founding 1,500 years ago. I also wanted to sample the culture and another plate of pasta.

Once I got settled in Venice, I turned a blind eye to the gondolas and statuary and started photographing the city's birdlife. I was working hard one afternoon when I noticed a woman gesturing in my direction. She couldn't mean me. I looked around — nobody here but us pigeons. Her beckoning finger did not waver. I jabbed a thumb at myself and raised my eyebrows. Yes, her face smiled. I got up from the pavement of the Piazza San Marco where I had been drawing a wide-angle bead on a hundred pigeons. They exploded into the air as I shambled over to the Italian. She was an entrepreneur with a Roman face and musical, incomprehensible speech. Her livelihood also depended on birds. I photographed them, she fed them. Despite the language barrier, I felt a closeness.

She handed me her business card, then turned to take from a wide woman tourist a thousand lira note in exchange for a paper sack of corn. Eyes shining, the woman dug her hand into the corn and sprinkled it on the pavement, drawing pigeons from across the huge square. Small flocks flew over the heads of thousands of other tourists and tens of thousands of other pigeons that were gobbling the corn. The birds flew past the arches of the Palazzo Ducale, flung their shadows across Byzantine mosaics, and loosed their droppings

The tourists offered their hands and shoulders and scalps, enjoying the strange squeeze of cool, rubbery feet, the scratch of claws.

onto Sansovino's sculptures. Many eyes followed them: eyes that peered from beneath John Deere baseball caps, eyes from Japan and Indiana, eyes that lingered on each wingstroke and glint of iridescent plumage.

In addition to corn, the tourists offered their hands and shoulders and scalps, enjoying the strange squeeze of cool, rubbery feet, the scratch of claws. The birds outdid the artists and architects of dead emperors and dukes. People had come to see paintings and palaces, but had been seduced by pigeons. Although Venice's marshes were long gone, birds—all of them pigeons—still outnumbered humans two to one. I couldn't help speculating on the great tourism potential of a species in addition to pigeons. I photographed the birds for two days and then checked out of my hotel.

On the drive north into Austria, a field of poppies and ripe wheat lured the Fiat to a stop. Among the rows were starlings. They burst upward, one flock with one mind, a brown swarm that waltzed over the golden grass and red blooms. I followed the dance through the viewfinder, recording in its native habitat America's least favorite bird. It didn't look any different here — the same straight, fast, buzzing flight, the chestnut plumage glinting bronze and purple. If there had been red poppies in America instead of bluebirds, things might have been different for the starling.

When I reached the Neusiedler See, Europe threw me another curve ball. I was accustomed to photographing birds while hidden among bushes or from a blind built in a tree. Here I would take pictures from a house rooftop along the main street of town.

I struggled up the slippery tiles, dragging tripod and heavy camera, my belly stuffed with a Wiener schnitzel the size of a Texas oil slick. The family on the ground 10 feet below was worried that I was going to cripple myself and sue them. A group on the street hoped I would. A few more steps and I was out of conversation range and on my own. I relaxed. The crowd thinned. They figured I wasn't going to jump.

The peak of the roof offered all I could ask of a summer's evening. On one side I looked out over the Neusiedler See across the Austrian border into Hungary. Neat rows of grapevines surrounded the lake. Its birds were active — gulls, terns, waders, and waterfowl rising out of the narrow band of reeds that straggled along the shore. On the other side lay most of the storybook town of Illmitz, from my vantage point a patchwork of red and brown tiled roofs. Beneath the roofs were white stucco houses, barns with pigs and ducklings, restaurants, a post office. Beneath the houses were wine cellars lined with enormous barrels filled with wine from family vineyards. Now and then a tanker truck arrived and fished a thick hose through a cellar window to siphon out a thousand litres for bottling and export to America. Below roof level everything seemed to be thriving.

Above the roof was a different story. For centuries, white storks had been flying up from Egypt to nest on the roofs of this village. They fed on fish, frogs, snakes, rodents, worms, and slugs that lived in or near the lake. The villagers believed that good luck came to those whose houses were chosen by the storks. To attract the birds, rooftop nesting platforms had been erected, but most were empty. I could count the town's active nests — five. It made me nervous. If the storks disappeared, where would we get new babies?

I spotted a stork flying in from the lake. It veered off as it neared the village, making a big circle against the sky, playing hide and seek with the chimneys and steeples. Once downwind it set its wings and glided toward me. In a few seconds it was on a nearby nest, greeting its mate with upthrust bill. The three young storks awoke from the jumble of sticks and were soon pulling at the adult's partially opened bill. A dark shape, slick with mucus and digestive juices, glimmered as it slid from the big beak into a smaller one. The unfed young plucked at the parent's bill awhile before settling on the nest. The storks' eyes glazed over and closed. Down on the street, yellow lights winked on, people strolled by, a band tuned up.

At the bottom of the ladder, a farmer was waiting. He handed me a glass of his muscat. "Zum vögeln," he said. "Yeah, here's to the birds." We clinked glasses.□

Tim Fitzharris would like to dedicate this article to the memory of his friend Gordon Sherman. Fitzharris's *Audubon Society Guide to Nature Photography* will be published in fall of 1990.

Further Reading

Peterson, Roger Tory, Guy Mountfort, and P. A. D. Hollom. *A Field Guide to the Birds of Britain and Europe.* Boston: Houghton Mifflin Company, 1983.

If the storks disappeared, where would we get new babies?

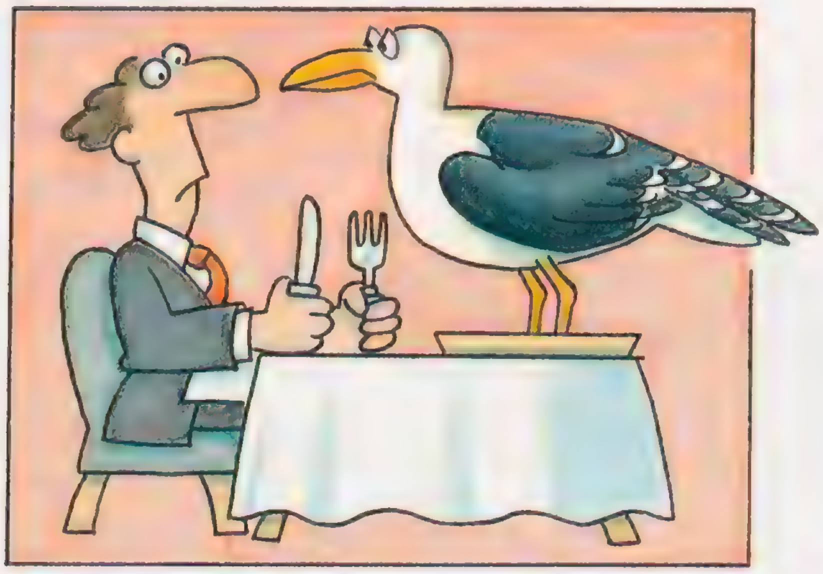
DAY OF THE MIGRATING HEADACHE

It began at 3:30 A.M. when the alarm buzzard went off, robin me of many hours sleep, and I had to pry open my eyes with a crowbar. Outside there wasn't a flicker of daylight. I live with my mother and sister, Linda. My name is Rich and if she calls me Dick Sis'll get hit. The smoke was already going up the chimney swiftly since my mother had been up early. I had even cedar waxwing the floor. I had tried to duck today's expedition, but despite my protestations, we were going bird watching.

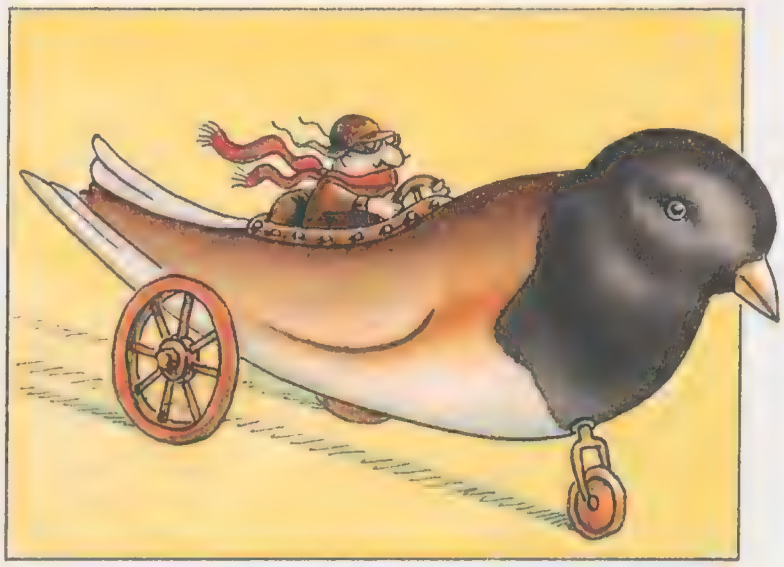
I thought I would spruce up; my baird was as ruff as a rock and felt like sandpiper, causing me to look harrier than usual. My back ached, so I did ostrich or two. Most mournings I dove into my breakfast. This day, however, I spilled my bowl of corncrakes and had to eat a baygull instead. I was definitely feeling blue, but Mom and Linda talked me indagoing anyway.

Finally we got into my Falcon, me and this peregrinning females. I wasn't exactly sitting in the catbird seat — the doughnut I dropped in my laplanded sugar-side down. It was a long drive, and I got a little noddy behind the wheel. Just before we reached the refuge we sighted a fork-tailed bird and I royally missed a tern.

Then my auto bonked out. Rattling came from the piping, and I had to plover to the upland side of the road. This didn't surprise me — the car is not brant new. Actually it's a piece of junco. I thought I might be out of petrel, but the gauge was at the fulmark. When I called a mechanic to see abert a tow hee said forget it. The trouble terned out to be fairy small, just a little bobolink.



I spilled my bowl of corncrakes and had to eat a baygull.



The car is not brant new. Actually it's a piece of junco.

My sister said it would still be a pheasant day — if it wasn't she knew she'd get a ringed neck. So when the wind began to whip, poor will developed between us. Then she yelled, "Stop the car — a bird!" At that moment I wasn't intecrested even in a myna way. It hardly mallard, since the bird she'd spotted was so high in the sky that to see it I'd have needed a crane or a sandhill, or at least stilts. I decided to get higher by taking a little stint up a tree, but I found that I was starling a woodpecker, so I came downy and put my ladder back. I never did see the bird, but I saw-whet turned out to be a big snake — I'd thought it was just a loggerhead — and let out a shrike.

Next we drove to a mountain, which had to be scaled to quailify us as real birders. It was a gambel but I begannet anyway. Part way up we saw a pochard in a field. He would cock his bow and arrow, but he was just a common sniper and only wanted to killdeer. I faced a steller choice: climb straight up or walk around a longspur. Eider way I would make a spectacle of myself. Finally I chose a route that was part ridge, part cliff, swallowing my fear and banking that I wouldn't tumble into a cave. Let me tell you, it was goshawkward. I wondered how a peewee like Sis

Richard Armstrong and Linda Armstrong

Illustrations by Anthony Taber

would get up this mountain. I thought I could oyster up and then catcher, but she climbed so well she gadwall ahead and I could gnatcatcher. I figured, I can do it if Siskin; if one can, toucan.

After recuperating, we went to a fancy park. I must admit I was ruddy to see ducks. I should have telephoned to find out if I needed a ticket or if it was a phoebe. Unfortunately, it cost so much I had to dipper into my nest egg again, and I ended up going black into hawk. But I could hear the birds tweeting and calling, *cheap cheap cheap.*

Inside the park I walked along hummingbird tunes and whistling the "Nuthatcher Suite." Suddenly I saw tree ducks, maybe four. I had no idea wigeons they were — they were feather away than I could see. I figured they were inca hoots against me. Once in a while a duck would bob white in front of me. One was dabbling — only its teal showed. It dove as if Merlin had made it disappear. I feel buffleheaded when I can't identify ducks; my siskin tell you. She knows all the birds and I woodpecker as an expert hands downy. When friends ask Mom about birds she always says her dotterel answer.

Then, like a dodo, I fell into the water. Cold, dark, sooty shearwater thrushed over me. When I got out I had goose bumps and looked like a booby. Also, I wasn't heron too well. Franklin, I am veery gullable, and I was laughing so hard I wrenched my funny bone apart.

Also, I wasn't heron too well.

My scaup was dry and I thought I was starling to go bald.

Now, I'm not the least bittern when others see all the birds because my attitube nose only pessimism, but I was frustrated. I had leaned over a rail until I was sora and had still seen nothing. I was becoming really tired and decided to avocet. It had been a long time since breakfast so I had a banana, quit moving, and took a gander at the sky. My sister kept asking wren we were leaving, and I told her I'd be everglade if she'd go fly a kite. I didn't want to chat so I read a bird book and condor into watching birds for me. Actually I would like to chuckalaca bird books — they are really gross because the pictures never look like the birds.

All in all I had taken a lot of bulbul that day. When I got home I took off my shoes and spotted sanderlingering and dirt hiding in both of them. It had been ruff, and I was puffin so hard my nostrils were flamingopen. I was limpkin and my redshanks were spotted with bug bites. My scaup was dry and I thought I was starling to go bald. Also I had a migrating headache. My stomach was in such a knot I even considered kestrel oil. To top it off, I had a yellow belly, my strength was sapped, and I knew I had been a sucker. Now, you understand I'm not mockingbird watching — I really love birds. But I must concurlew that there's no vulture in it for me. ☐

Linda Armstrong is a writer and regional editor for the Federation of New York State Bird Clubs, Inc. Richard is a chemist living in Texas.

LOOK, MOM, NO CAVITIES

Danny J. Ingold

One warm morning in late March 1984 on the Mississippi State University Campus, I sat on the grass near a sweet gum tree watching a pair of red-bellied woodpeckers taking turns excavating a nest cavity. The cavity, about 20 feet from the ground, was in a dying branch of an otherwise healthy tree. I watched the male woodpecker toss wood chips from the entrance of the cavity as the female searched for insects on a nearby tree trunk.

Filling a cavity — the more aggressive starling (above) succeeds in evicting a pair of red-bellied woodpeckers (right) from their freshly excavated nest cavity.

Suddenly I heard a sharp, high-pitched whistle from the branches above the cavity and noticed two glossy black European starlings in breeding plumage. As I watched, one starling swooped down at the male red-bellied, missing him by inches. The woodpecker immediately counterattacked, chasing the starling to the outer branches of the tree. As the male red-bellied furiously scolded his attacker, the second starling flew down and entered the cavity the woodpecker had just excavated.

The male red-bellied kept harassing the first starling for a few minutes, but then he seemed to lose interest and flew back to his cavity. When he peered in, however, the starling that had sneaked in poked its head out and startled him. The male red-bellied began to chirp loudly near the cavity entrance; the female soon joined in. The starling withdrew into the cavity.

A standoff began. Finally, after a full hour, the starling left the cavity and flew away. As I finished my observations for the day I was cautiously optimistic that the woodpeckers would keep their cavity. When I returned two days later, however, I was shocked to find a pair of starlings busily transporting nest materials into the hole.

During the past 50 years many similar incidents of starlings driving woodpeckers from freshly dug nest cavities have been reported. Starlings are one of the many birds, including bluebirds and wrens, that prefer cavities for nesting but cannot excavate their own. Such birds depend on natural cavities, nest boxes, crevices in buildings and other structures — and the cavities dug by woodpeckers.

Why are cavities such popular nest sites? Cavities offer protection from harsh weather and predators, so the birds that nest in them usually produce more offspring than birds that nest in the open. But cavity nesting has a disadvantage, too. Cavities are in short supply and competition for them is fierce — especially among birds that cannot dig their own. Although woodpeckers can excavate cavities, they too may face competition because the supply of suitable dead branches and trees is limited.

I was intrigued by the starlings' ability to outcompete red-bellieds. Data from several bird surveys taken during the last 20 years show declines in red-bellied woodpeckers in the eastern part of their range. I wondered to what extent starlings were responsible, and I decided to focus on this question for my doctoral research at Mississippi State University. Specifically, I asked whether starling harassment was lowering the number of offspring produced by the red-bellied woodpecker. Since red-bellied woodpeckers and starlings commonly nest in the farmlands, towns, and suburbs of east-central Mississippi, I could study them on the Mississippi State University campus and in the nearby city of Starkville. Both areas are characterized by lawns, roads, buildings, and abandoned lots with scattered hardwood and pine trees and occasional dead trees.

I began my study in 1984 and continued it over three breeding seasons. One of my first tasks was to search out red-bellied pairs excavating nest cavities. Fortunately the birds aren't too difficult to find, especially in town, where the trees and branches preferred by nesting woodpeckers are less common and thus more conspicuous. When I heard a woodpecker calling, I could often spot the tree where I thought the male or its mate would choose to nest. Since red-bel-

DAVID McEWEN (2)

STEVE CARVER

OUTRAGEOUS FORTUNE

Perhaps inspired by the words in Shakespeare's *King Henry IV,*

Nay,
I'll have a starling shall be taught to speak
Nothing but "Mortimer," and give it [to the King]
To keep his anger still in motion,

Eugene Scheifflin introduced 80 European starlings into New York City's Central Park in 1890. Scheifflin, a bird watcher and influential figure in the American Acclimatization Society, thought that birds were scarce in America compared to England. His ambition was to introduce into this country every bird mentioned in Shakespeare. He tried many different species, but most didn't take. His two successes, however, were spectacular — the house sparrow, which he is thought to have established in 1860, and the starling, which is probably the most numerous bird in North America today. Shakespeare notwithstanding, people have been trying to get rid of both species ever since.

Ironically, starlings initially didn't seem to want to live in North America. In Scheifflin's era, organizations that introduced alien species, like the American Acclimatization Society, were in vogue. Groups and individuals tried repeatedly to found starling colonies—in Cincinnati and Quebec, in Portland, Oregon, and Tenafly, New Jersey. The first attempt occurred before 1850. Sometimes the birds hung on for a year or two; sometimes they were never seen again once freed from their cages. It wasn't until more than 40 years after the earliest attempts that Scheifflin succeeded. The first wild starling eggs recorded in the New World hatched in 1891 beneath the eaves of the American Museum of Natural History in New York City.

After a decade or two of reproducing around the city, flocks of starlings began to sweep out over the country. Accounts of their dispersal read like stories about the advance of an invading army. By 1911 the birds had reached Albany. In 1915 they were established in Nova Scotia, and two years later one was found as far south as Savannah, Georgia. By the late 1920s, their range included everyplace east of the Mississippi. Hopes that the Great Plains or Rocky Mountains would bar their advance were dashed by the discovery of individuals in California in 1942 and near Juneau, Alaska, in 1952. Today their breeding range extends from arctic Canada to southern Mexico.

Almost from their introduction, starlings aroused apprehension among amateur and professional bird enthusiasts. The eminent ornithologist Edward Howe Forbush, who went to extraordinary lengths to discern and report virtues in the birds he wrote about, predicted as early as 1915 that the starling population would increase tremendously, and that it would probably "be necessary to deny it the legal protection now afforded to insectivorous birds."

His prediction proved accurate. Today some urban roosts house 200,000 to 300,000 birds, and most newspaper stories about starlings deal with efforts to kill them or chase them away. In addition to competing with native birds, large congregations foul streets with their droppings, get sucked into airplane engines, injure fruit in orchards, and cause other, more unusual problems. In 1975, for example, John W. Miller reported in *Natural History* that bridge painters in New York had to use chisels and hammers to crack 18-inch-thick guano cakes from a bridge favored by starlings.

Techniques for getting rid of starlings range from the ghastly to the ridiculous. One approach, used in 1931 to drive starlings from the eaves of two government buildings in Washington, involved eight men with "cat-o-nine-tails whips on short poles with several strands of flexible wire attached," which "were used to lash the ledges below the eaves" where the birds were roosting. (It worked, according to Bent's *Life Histories.*) Elsewhere, birds have been fumigated with cyanide. They've been sprayed with detergent so they'll die of exposure, and their roosts have been smeared with a chemical jelly that burns their feet. One enterprising person designed a fake owl that periodically popped up from a concealed position and hooted. Another produced a plaster-of-Paris cat covered with mirrors.

Playing tapes of starling distress calls drives them away for a while, but starling distress calls distress people, too. Standard approaches—shooting, trapping and gassing, installing electric wires or various noisemakers — have also been tried, but even when they work the surviving starlings just go bother someone else.

Scheifflin, it seems, succeeded beyond his fondest expectations. We may deplore the starlings' effect on native birds, but since we're stuck with them we might as well enjoy them. A starling in winter plumage — glossy black feathers iridescent with violet and green and sprinkled with beige specks — is a beautiful thing, and a flock wheeling in rollercoaster flight on a late fall day is enough to make us understand why Scheifflin wanted so badly for us to see them. — D. I./D. O.

lieds call frequently in the spring, often from their nest cavity, it was usually easy to find the birds once I'd heard them.

From mid-March into July and August, I spent my days riding my bicycle from one nest site to another. I'd watch for half an hour at each site—longer, if starlings and red-bellieds were interacting. To keep people from worrying that I was a peeping tom—I always had my binoculars with me—I introduced myself to the curious and eventually became known as "the woodpecker man." The local newspaper even published a picture of me and the story of my research. As a result, people began calling to tell me about the events at "their" woodpecker cavity.

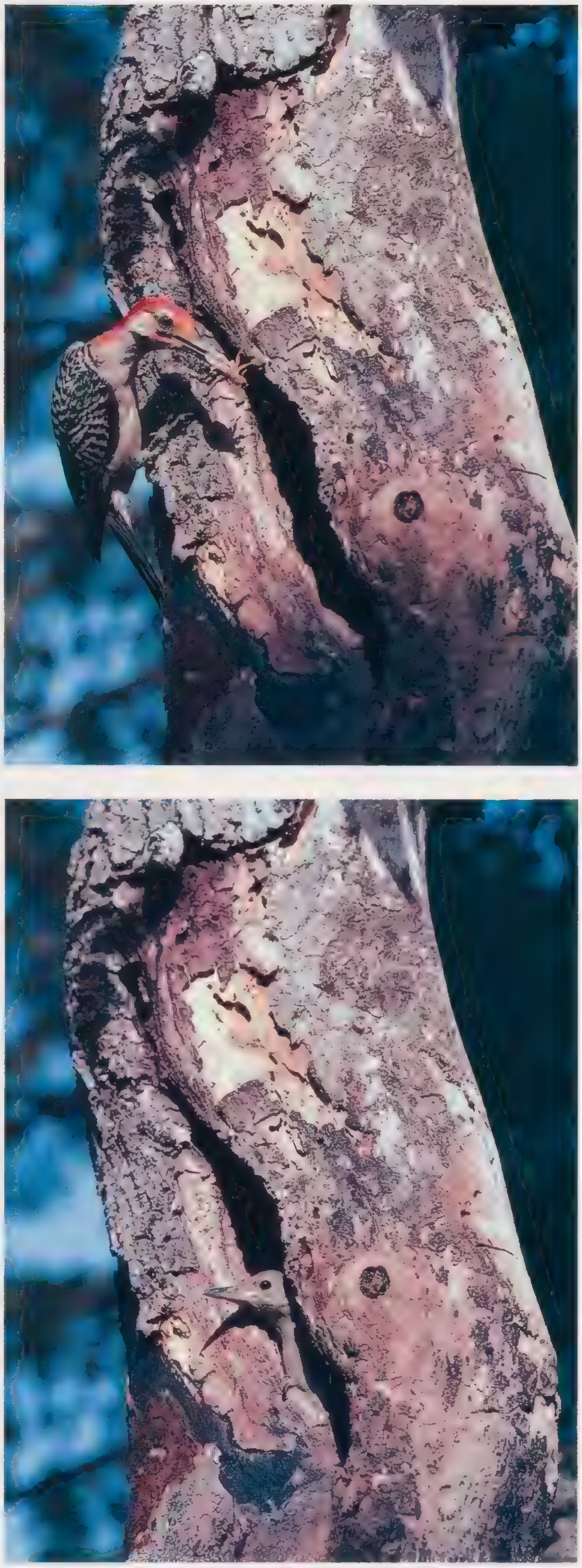
Once I'd begun making regular observations, I realized that a reason red-bellieds are particularly vulnerable to starling takeovers may be because the two species nest at precisely the same time of year. Just as the woodpeckers finish excavating their holes, the starlings want to move in. Another cavity-nesting woodpecker, the red-headed, nests later in the season and has much less trouble with starling harassment. The red-bellied's vulnerability is reflected in my finding that, of the more than 100 freshly excavated nest cavities I observed, more than half (52 percent) were taken away by starlings.

When they don't have to fight off competitors, red-bellieds take about 10 days to dig a cavity. Both members of the pair excavate. When a cavity is finished, the pair often pauses a day before starting to lay eggs. On a bed of wood chips at the bottom of the cavity, the female typically lays an egg a day for up to six days; then both sexes take part in incubation.

Attempts to usurp a woodpecker cavity usually involved two or three starlings. The third starling, and occasionally a fourth, were "extra" birds that may have been one-year-old, nonbreeding relatives of the breeding pair, or perhaps other breeding starlings competing for the same site. When the starlings located a red-bellied pair excavating a cavity, they usually observed the pair for two to three hours at a stretch for up to four consecutive days. The closer the cavity was to completion, the longer they waited. Occasionally starlings entered unfinished red-bellied cavities while the woodpeckers were away, but they seldom tried to take over a cavity until the excavation was complete. Sometimes the starlings did not discover a red-bellied cavity until after it was finished.

During a cavity takeover attempt, single starlings frequently tried to chase one or both red-bellieds from the cavity tree. Sometimes a second starling entered the hole while the woodpeckers' attention was diverted. Less frequently, a single starling flew directly to a nest hole and entered while woodpeckers were nearby.

Once inside, starlings were difficult to evict, and the woodpeckers and starlings began a waiting game that lasted from a few minutes to an hour. On several occasions I saw a woodpecker pursue a starling into a nest hole. In such instances the scuffling and squawking inside the cavity was so loud that I could hear the racket 100 feet away, and it could last as long as five minutes. On at least three occasions I watched red-bellieds try to drag out starlings by their wings or tails. They never succeeded, though, probably because the woodpeckers couldn't get a secure grip on the starlings. Scuffles in cavities typically ended with both birds flying out, usually with the starling chasing the woodpecker.

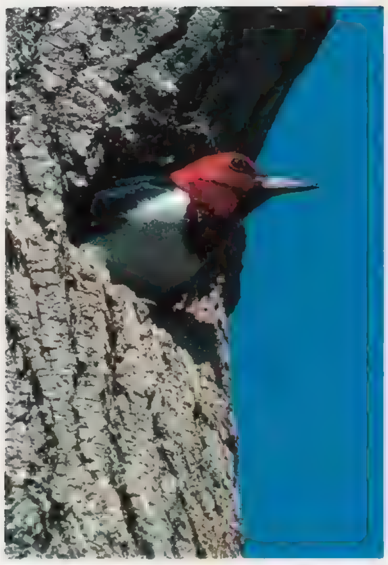


Male red-bellied woodpecker brings fledgling a cricket. Evicted woodpeckers may excavate a new cavity, but ultimately fledge fewer offspring than woodpeckers not harassed by starlings.

DAVID MOLCHOS (2)

Red-bellieds defending their cavities won many of

DAVID McEWEN



Red-headed woodpeckers aren't bothered much by starlings because they nest late in the spring after starlings have selected nest holes.

the early battles with intruders, but the starlings were persistent, and after red-bellied pairs were relentlessly harassed for three to five days, they usually gave up the fight and abandoned their cavity. The evicted woodpeckers usually began another nesting effort near their original nest tree. In a few cases I saw red-bellied pairs lose two freshly excavated nest cavities to starlings in a single breeding season; however, most evicted pairs fledged at least one offspring at another location before the breeding season was over.

Although interactions involving starlings and red-bellieds sometimes resulted in a few feathers flying, I seldom saw any evidence that a bird of either species was injured or killed. When the going got rough, the red-bellieds usually gave up, opting to begin again at another location.

One exception, however, is noteworthy. In early April one year, I located a red-bellied pair excavating a cavity in a small dead limb high in a loblolly pine. Not surprisingly, a pair of starlings was perched in a nearby tree, awaiting their chance. During the next hour the male red-bellied and a starling scuffled intensely and repeatedly near the entrance. The male woodpecker seemed to successfully defend the cavity since it prevented the starling from entering. After 45 minutes the starling pair retreated to another tree, and the red-bellied pair reunited near the cavity entrance. I left with some hope that the woodpeckers would prevail.

Three days later, however, both starlings were perched in the cavity tree and I saw no sign of the woodpeckers. I returned two days after that expecting to find the starlings building a nest inside the cavity. Instead I saw neither starlings nor red-bellieds—until I looked more carefully. Stuck in the entrance was the dead male red-bellied. When I retrieved it I found that many of its head feathers were missing and a hole the size of half a dime had been gouged into its cranium. Although I had not witnessed the death, I think it likely that the starlings were responsible. After the incident I never re-located the female red-bellied, and the starling pair that had fought so intensely for the cavity also failed to return.

During this study I witnessed over 100 starling–red-bellied interactions, and the woodpeckers were aggressors in only a third of them. Red-bellieds, it seems, are simply not as combative as starlings. But this observation did not answer my original question — does starling harassment cause red-bellied woodpeckers to produce fewer young?

Fortunately my study included some red-bellied pairs nesting in areas where breeding starlings were absent. Starlings prefer to nest in open areas, so the birds sometimes pass up suitable nest trees because they are surrounded by dense vegetation. I was able to compare 16 starling-free red-bellied pairs with 17 pairs that faced starling competition.

My findings were striking. The former group fledged 53 nestlings, the latter only 38 — a significant difference. These numbers suggest that red-bellied reproduction was indeed thwarted as a result of starling competition, probably because the woodpeckers were forced to spend prime nesting time searching for new nest sites. Forty percent of the starling-free red-bellieds reared two broods, but none of the starling-bedeviled ones did.

It is difficult to say just how the starling-woodpecker story will end. Although starlings are probably here to stay, natural selection may help resolve the conflict. Starlings thrive among humans and their surroundings. Red-bellieds, however, have healthy populations in more remote habitats where breeding starlings are uncommon. These woodpeckers probably do not face an immediate threat from starling competition; in fact, they face a greater threat from people with chainsaws cutting down dead limbs and trees and destroying their habitat.

Red-bellieds that continue to share nesting areas with starlings face a different dilemma. If more aggressive woodpeckers produce more offspring, the population may gradually evolve to the point where they can defend their cavities with increased vigor. Or perhaps red-bellieds will learn to nest more frequently in areas with abundant vegetation, which starlings tend to avoid. It is also possible that red-bellieds will adapt to nesting later in the spring, as red-headed woodpeckers do, and thereby decrease the competition with starlings. Bad times would befall woodpeckers if more dead trees and limbs are cut down and competition for cavities intensifies. In this case red-bellieds nesting with starlings could eventually be excluded from some areas. The worst situation for the woodpeckers would be if starlings expanded their breeding range to include all types of forested habitats, even remote rural ones. Then red-bellieds would be forced to become more efficient competitors with starlings or they would be excluded from many of their major strongholds.

At this time little evidence exists to support any of these speculations. I am hopeful, however, that as long as humans leave enough nest trees available, selection will continue to operate and red-bellieds will adapt to cope with starlings. I am reminded of one red-bellied pair that I observed during the third year of my study. The birds were harassed by starlings from late March until mid-June. The outcome of this pair's battle is cause for some optimism, for they never relinquished their cavity, and even in the face of persistent starling harassment they managed to raise a brood. □

Danny J. Ingold received his Ph.D. in zoology in May from Mississippi State University. He begins work this fall as an assistant professor at Muskingum College in New Concord, Ohio.

Further Reading

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Feare, Christopher. *The Starling.* Oxford, England: Oxford University Press, 1984.

"Three Wild Geese and Moon" by Hiroshige. Museum of Art, Rhode Island School of Design. Gift of Mrs. John D. Rockefeller, Jr.   Poem courtesy Princeton University Press.

THE GEESE

Today as I hang out the wash I see them again, a code
as urgent as elegant,
tapering with goals.
For days they have been crossing. We live beneath these geese

as if beneath the passage of time, or a most perfect heading.
Sometimes I fear their relevance.
Closest at hand,
between the lines,

the spiders imitate the paths the geese won't stray from,
imitate them endlessly to no avail:
things will not remain connected,
will not heal,

and the world thickens with texture instead of history,
texture instead of place.
Yet the small fear of the spiders
binds and binds

the pins to the lines, the lines to the eaves, to the pincushion bush,
as if, at any time, things could fall further apart
and nothing could help them
recover their meaning. And if these spiders had their way,

chainlink over the visible world,
would we be in or out? I turn to go back in.
There is a feeling the body gives the mind
of having missed something, a bedrock poverty, like falling

without the sense that you are passing through one world,
that you could reach another
anytime. Instead the real
is crossing you,

your body an arrival
you know is false but can't outrun. And somewhere in between
these geese forever entering and
these spiders turning back,

this astonishing delay, the everyday, takes place.

—*Jorie Graham*

Birding with Antonio

He looks like anything but a bird-tour guide. He's wearing a tan suede jacket, his Oxford shirt is clean, his ample stomach protrudes over gray dress slacks. But a bird-tour guide he is, and right now he's guiding in full swing. "Come quick!" he shouts, jumping with excitement. "Cock-of-the-rock! Cock-of-the-rock! We see him, for sure!" Frantically he waves us forward.

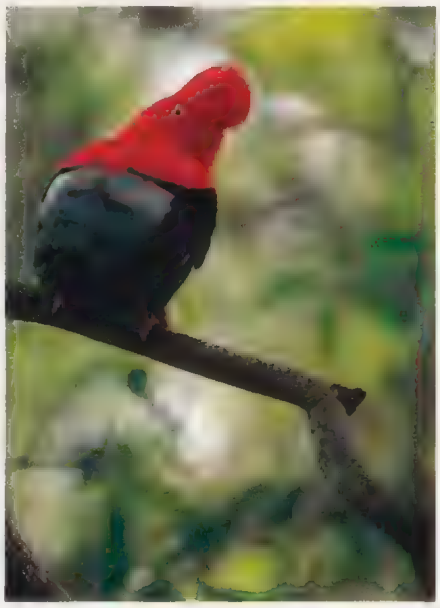
Seconds later I see one, then two, then several of the oddly crested birds. They're a few hundred feet away, across a narrow valley, popping in and out of view amid dense tropical foliage. Despite their bright-red plumage they're hard to make out, and in a few moments they're gone, their querulous *uankks* drifting into the cloudforest. But Antonio Torres is happy. He'd promised that our small group of bird-watching travel writers would see these birds, and now, consummated, he leads us victoriously back to our bus.

We're high in the Andes of Ecuador, land of volcanoes, birder's paradise. It's but three days into our visit, yet already we're awestruck with birds. From our home base in the pleasant capital city of Quito we've taken two simple day trips. We've gone to the nearby mountain forest and high treeless plateau, and we've spied 57 species, including such spectacular sights as the great sapphirewing, russet-backed oropendola, and scarlet-bellied mountain-tanager. Still, promises Antonio, "We haven't seen anything yet. Just wait."

This trip was launched when I received a phone call in November 1987, from a New York City travel agency. Would I like to attend a bird-watching tour to Ecuador for members of the "birding press"? The trip would be sponsored by Metropolitan Touring, a major Ecuadorian travel company, and Eastern Airlines, which at that time was the sole domestic carrier into that country.

Three weeks later I was on an Eastern jet high over the Caribbean, en route to Ecuador, a Utah-sized country in South America's northwest corner. My seatmate was the redoubtable Michael Harwood, on assignment for *Audubon*. Like me, Mike is a literature junkie, and long before we cleared the Panama Canal, the two of us were drowning in a welter of maps, bird lists, and field guides. "Azara's spinetail," I'd tell him, "look that one up. We're supposed to see it in Pasachoa Forest." And Mike would find it, and point to its picture, then point to the nearly identical pictures of eight other spinetails. And we'd look at each other in dismay.

But now, rattling down a spectacular mountain road three days and 57 species later, all dismay has vanished. The birding hasn't been easy, I admit. For one thing, the birds here are mostly secretive. Also, every car, truck, and bus that rumbles past our roadside vantage points sends a choking cloud of black smoke and volcanic dust into our eyes, cameras, and binoculars. But identifying the mountain birds once we find them has not been too hard, owing mostly to the skill of Antonio.



JOE McDONALD

I confess I was dubious about him when we met at the tiny Quito airport. I guess I expected a trim fellow in a bush vest with a pair of 10 × Zeiss slung casually across his shoulder instead of a stout man in polished street shoes with a battered pair of discount-store binos clutched in his hand. But appearances deceive, and in the last three days Antonio has quickly proven to be knowledgeable not only about birds but about all things Ecuadorian.

For example, he led us through customs in about 20 seconds, explained how to eat to avoid the scourge of "turista," and gave us an historical tour of Quito's streets and buildings. He lectured on Ecuadorian natural history, the derivation of the metric system, and the Ecuadorian literature known as "magic realism." And now, as the bus lurches back toward Quito, he's holding forth again. Who knows what motivated him this time, but he's jumped from his copilot's seat, grabbed an overhead rail for stability, and is telling us Ecuadorian folk tales. He finishes just as we approach the Hotel Colon, our modern and comfortable home base, ready for dinner and sleep before we head out the next morning for a four-day road trip.

On our way out of town the next day our bus rolls again through the streets of Quito, a clean and attractive city high in the snow-covered mountains. Walls and gates run every which way, providing perches for ubiquitous rufous-collared sparrows, whose calls remind me of the rufous-sided towhee back home. Everything is brightly colored—vehicles, clothing, signs, doorways. The only sign I can read says "Coca Cola."

I was dubious when we met—but Antonio is knowledgeable about birds as well as all things Ecuadorian.

Leaving the city and heading south along the Avenue of Volcanoes I'm struck by the extent of surrounding farm fields, which are so steep that I wonder how anyone can stand upright to tend their crops or cows. Antonio tells us that all this land is highly fertile because the soils are volcanic. Originally it was covered with bush forest, but because the land is excellent for farming, by the late 1800s it was virtually all cleared for agricultural crops—corn, potatoes, lima beans, and dozens of other vegetables. Nevertheless the mountain scenery is breathtaking, and before long we get a terrific view of Mt. Cotopaxi, the world's highest active volcano, snow-covered all year and majestic in the morning sun.

We're headed east for Pasachoa Forest, an Andean shrub forest in the crater of Pasachoa Volcano. This forest is preserved by Ecuador's Fundacion Natura, a chapter of the World Wildlife Fund, and when we arrive I immediately feel at home. During the past two days we've birded by climbing off the bus and standing or walking along the road, at the mercy of the dust and blaring horns of passing vehicles. Here we find miles of trails through undisturbed forest. Birds call and sing along a pretty stream surrounded by lush green vegetation, but I don't know any of the avian voices—a strange feeling because at home birding by ear is my specialty. The birds here are less secretive than along the roads, though, and it's easy to see breathtaking species such as spectacled redstarts, sapphire-vented pufflegs, and black-tailed trainbearers—hummingbirds with tails so long you'd swear they'd get in the way as the birds dart through the vegetation.

A few hours later we head back to headquarters for a picnic lunch. We sit under a thatch-roofed shelter eating sandwiches and watching blue-and-white swallows dart overhead, then buy Fundacion T-shirts, whose proceeds help to support the sanctuary. So far this is the only property the Fundacion manages. In fact, Antonio takes this opportunity to give us a sobering lecture on Ecuadorian ecological awareness, which he claims is virtually nonexistent. "Ecuadorians," he says, "don't think much about ecology. They don't even go birding. In fact, you can count the number of serious Ecuadorian birders on two hands."

It's not surprising. Outside of the city most of the people appear impoverished. We see them tending fields, or squatting beside the road, or staring blankly from doorless, windowless shacks. It doesn't look like they're searching for leisure activities.

Next we press toward Cotopaxi National Park. As a lover of mountains I'm exuberant as we enter the park and drive ever higher. Even the start of a steady drizzle fails to dampen my spirits. Every few minutes we clamber out of the bus to wander around and look for birds. Few are about, perhaps because of the wind and wet and cold. Still, we find stout-billed and bar-winged cinclodes, a many-striped canastero, and a plumbeous sierra-finch, whose scientific name, *Phrygilus unicolor*, bespeaks its all-gray plumage. Cotopaxi's peak, with its perpetual snowfields, disappears and reappears among the shifting clouds.

Eventually we come to a huge, flat expanse of tundra at about 11,000 feet and again climb from the bus. It's really cold here, and reminiscent of the Rocky Mountain peaks of Colorado. In a small lake we see a yellow-billed pintail; nearby a pair of Andean lapwings harass a carunculated caracara easily twice their size. We also see an Andean hillstar, a gorgeous hummingbird found only at high elevations. We look without success for an Andean condor, then, wet, shivering, and hungry, we head back for lower ground.

On our way out of the park Antonio points to the forest around us, mostly rows of eucalyptus and pine. "See those trees?" he asks with a faint scowl. "They don't belong here. They're all planted. The native vegetation is mostly gone here, the birds too. The birding here is terrible." Later I would read that the eucalyptus is a phreatophyte, a tree whose roots absorb more water from the soil than the soil receives from rain. Therefore, plantations of these introduced trees are causing many Andean hillsides to become deserts.

We spend the night at nearby La Ciénega, a small and charming hotel, one of Ecuador's oldest. Here, either from newfound camaraderie or a few rounds of cervezas, the group really begins to come alive. Talk turns to the difficulties of surviving as a travel writer, and tales of woe and adventure get taller and funnier. The next morning Antonio, Mike, and I seem to be the only ones interested in bird watching. Together we wander the grounds watching trainbearers, with their tails wafting in the breeze, and find three new bird species—cinereous conebill, band-tailed seedeater, and black flowerpiercer. Then, waiting for breakfast, we sit in the garden and I ask Antonio how he came to be in the tour-guide business and how he got started in birding.

R. BONNEY

Antonio promised we'd see an Andean cock-of-the-rock and, pictured left, we did. Above, Antonio cites Birds of Colombia *while debating an identification with the redoubtable Michael Harwood.*

"I was born and raised in Quito," Antonio told me. "I went to Central University there and received a degree in journalism, then I got a job doing sports reporting. That was boring, though. And a dead end.

"So I looked for another job. I had good English, mostly because I spent a summer in Buffalo, New York, as an exchange student in high school. So I was able to get a job with Metropolitan Touring. That was in 1970. Back then I didn't watch birds. In fact my first tours were taking people from Ecuador to Disney World.

"Later, though, when Metropolitan began doing support for nature tour companies from the United States, I helped out as a local contact. But I still didn't know much about birds. Then, one day in 1981, I was helping with a Questers Tour, and the leader saw a hooded mountain-tanager and told me to look at it through his binoculars.

"It was so beautiful. I became hooked. I started to study birds, and butterflies and orchids, and before long I was leading nature trips without help. But this work, it's very hard. Once I didn't see my family for 56 days. So about three years ago I told Metropolitan I could work only part time. Now I lead only birding trips. My wife and I, we make our living mostly by exporting handcrafts."

How did he learn the birds? I asked. "It was not easy," he says. "I learned some from American tour leaders. But mostly, I just taught myself."

Incredible, I think, sitting in the sun, watching brown-bellied swallows dart overhead. How can he sort out all these birds by himself? In America we have easy-to-use field guides, Saturday morning bird walks, spring courses in warbler identification, knowledgeable birding friends. But in Ecuador there are no walks, no clubs, no mentors. There isn't even a field guide—one makes do with either *Birds of Venezuela* or, preferably, *Birds of Colombia* by Steven Hilty and William Brown—two of the most bewildering field guides I've ever seen. Antonio already had me impressed; now I'm amazed.

After the rest of the group finally appears and eats breakfast we leave La Ciénega and head west toward the coast and our final destination, the place I've heard so much about, the place that Antonio promises will make my head "be filled with birds." Since it is already, I can hardly imagine what the legendary Tinalandia, a resort on the outskirts of Santo Domingo de los Colorados, will be like.

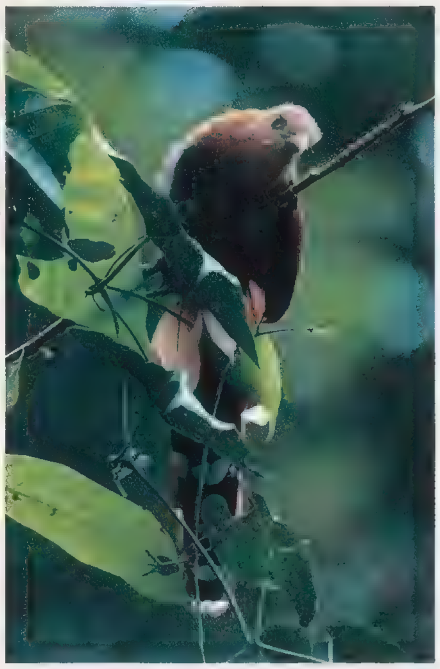
Tinalandia has a fascinating history. It's run by Tina de Garzon, an 80-year-old Russian emigré who, along with her first husband, a Cossack, acquired the land from the president of Ecuador in 1936. For many years they grew sugar there. When the Cossack died Tina married Alfredo de Garzon, who switched to growing coffee until that became unprofitable. Then Alfredo converted a big chunk of the farm to a golf course! But he left 60 acres of pristine jungle, which contains the only native vegetation remaining in the area, and therefore attracts neat jungle birds such as barbets and toucanets. I'm dying to see a toucanet, which for me is the symbol of the jungle, and I've heard that they are fairly easy to see at Tinalandia because of clearings created by fairways and greens. So, as the bus descends into thickets of bamboo and banana at 2,700 feet, I'm ready for some real fine birding.

When it flies away I look at Antonio, who pushes back his cap and grins. I grin back—then I realize something.

But I'm not prepared for *how* fine. Within moments of our arrival we're sitting on the veranda eating lunch and watching swallow-tailed kites swooping past at eye level and golden-olive woodpeckers working up vine-laden trees just a few feet away. After lunch I walk the half-mile up to our cabins and see a masked water-tyrant, a gorgeous white flycatcher with black wings and tail tip. When I reach the cabins and the rest of the group, who've ridden up in a van, I find myself in a frenzy of birds. Even the less committed birders are yelling and gesticulating at bird-filled trees. "Common tody-flycatcher!" "Black-faced dacnis!" "Band-backed wren!" Then Antonio comes running, pointing skyward. "Look up! Bronze-winged parrots!" Sure enough, a flock of 15 or 20 of the raucous birds sails overhead, ultramarine silhouettes against the sun.

We spend the afternoon and the next day at Tinalandia, eating copious quantities of excellent food, drinking assorted cervezas, and birding the golf course. I should explain that "resort" as a descriptor of this place may give a mistaken impression. It's a wonderful spot, and the amenities are certainly sufficient, but posh it isn't. "Run down" is a bit more accurate. Mike calls it eccentric, and gets a big kick out of the hydropower generating sys-

R. BONNEY



GEORGES DREMEAUX

tem, which spills a substantial waterfall on us every time we pass under the sluiceway.

But neither he nor I nor the birds mind, and we delight in red-headed barbets, squirrel cuckoos (which from a distance really do look like squirrels), and bay-headed tanagers, resplendent birds with brick-red heads. But at day's end we still haven't seen a toucanet, and after a long walk through what looks to me like a wild tangle of house plants, Antonio and I sit alone in a clearing and I receive another of his sobering discourses.

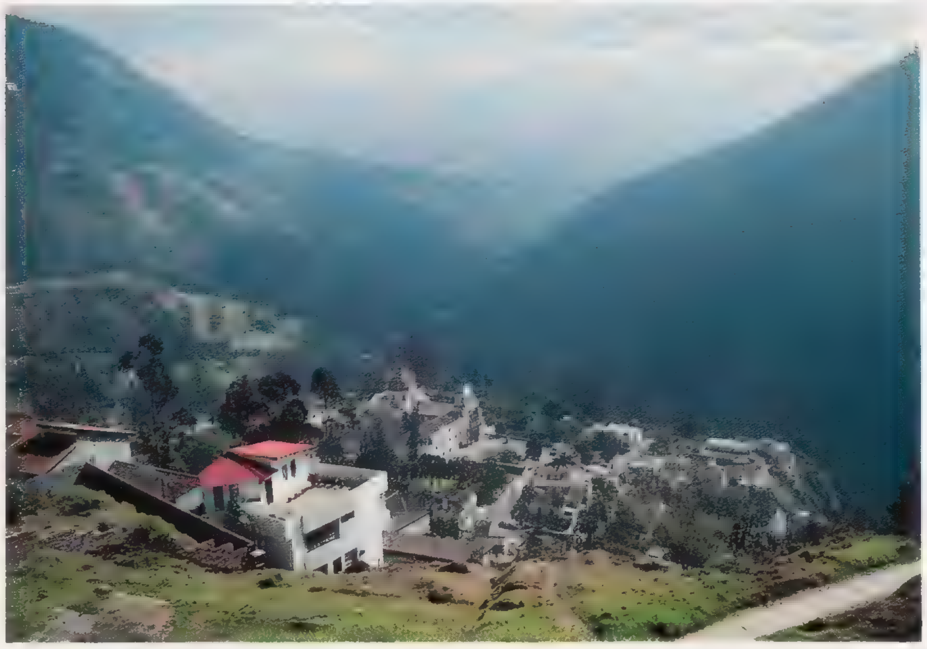
"You think the birding here is good, and I don't blame you. But it isn't good. I've been coming here for what, six, seven years, and the birds are disappearing fast. Six years ago I could have shown you all the toucanets, all the parrots you wanted to see. Now they're nearly all gone. The reason, I think, is all the clearing. The forests around here are being cut down for crops and for sugarcane, to make rum. For export.

"You go back home, and write an article, and I hope you get lots of people to come to Ecuador to watch birds. We need the interest, the . . . " he searches for the right English word " . . . enthusiasm of American birders if we're going to save much. There's some people here who care about our environment, but . . . ."

He stops in mid-sentence and stares into the distance. I think I know what he's trying to say, though. I think his good manners are stopping him from pointing out that, while Ecuadorians are responsible for much of the destruction of their country, the United States and other consumer nations are also responsible, first by setting an example for habitat destruction, second by demanding goods that are produced and exported from Ecuador to that country's detriment. And I think he's trying to say that he wishes more Americans would come down to see what they're helping to destroy.

Our final dawn greets me with fog and drizzle. The morning's birding crew is Antonio, me, and two others—everyone else is either tired or wants to stay dry. Undaunted, we walk along a trail into the gloom. Suddenly Antonio grabs me by the shoulder and points upward. I catch movement, squint, focus, and there in my binoculars is the most amazing bird I've ever seen. It's a toucanet at last, a crimson-rumped toucanet, and I can hardly believe the huge red bill, the bright green body, the blue band across the belly. When it flies away I look at Antonio, who pushes back his cap and grins. I grin back, feeling a lump in my throat. And then I realize something. I think of all the times I've complained about destruction of the tropics. I think of the standard American conservationist line, "the birds that nest in our backyards—they spend their winters in the tropics. What's going to happen to 'our' birds when the tropical forests are all destroyed?"

But now I feel different. Forget about our birds; what about the toucanets, parrots, motmots, mountain-tanagers, bush-tyrants, and chat-tyrants? What's going to happen to them when the tropical forests are all destroyed? Where are *they* going to go?



R. BONNEY (2)

Ecuadorian snapshots. Clockwise, from bottom left: Old Chiriboga Road near Tinalandia; squirrel cuckoo; outskirts of Quito, high in the Andes Mountains; Quito's Plaza San Francisco during the annual Fiesta de Quito.

Later that day we come back to Quito. We spend our last afternoon shopping for sweaters, and that evening we meet for a final dinner. We reflect on the week, reminisce about birds, tell tales. Afterward Antonio takes my hand in parting, and we linger over good-byes.

"I've got so much more to show you," he tells me. "There are so many more birds. And we have to go to the Amazon. Come back!"

I hope I will.

—**R. E. Bonney, Jr.**

What Color Is a Gannet's Bill?

Bob Repenning, my friend and guide, was setting the anchor of his boat when I spotted the bird. "Hey, here's a gannet," I said.

Home in New Jersey, a huge, white bird with black wingtips gliding over salt water can only be a gannet. But I was standing shin-deep in the Gulf of Mexico, on Johnson's Shoals, five miles off the southwestern coast of Florida. So, as Bob straightened up to look, I added, "Or maybe it's a masked booby."

"Get back in the boat!" Bob said.

He heaved the anchor back on board, push-started the engine to a roar, and we were off—hammering across the waves like Crocket and Tubbs in the credits of "Miami Vice." Cormorants fluttered right and left, loons dove, gulls scattered.

"It has the wing pattern of a gannet," Bob shouted as the bird banked ahead of us. "Don't boobies have more black on their wings?"

"I'm not sure," I shouted back.

"Where's the field guide?"

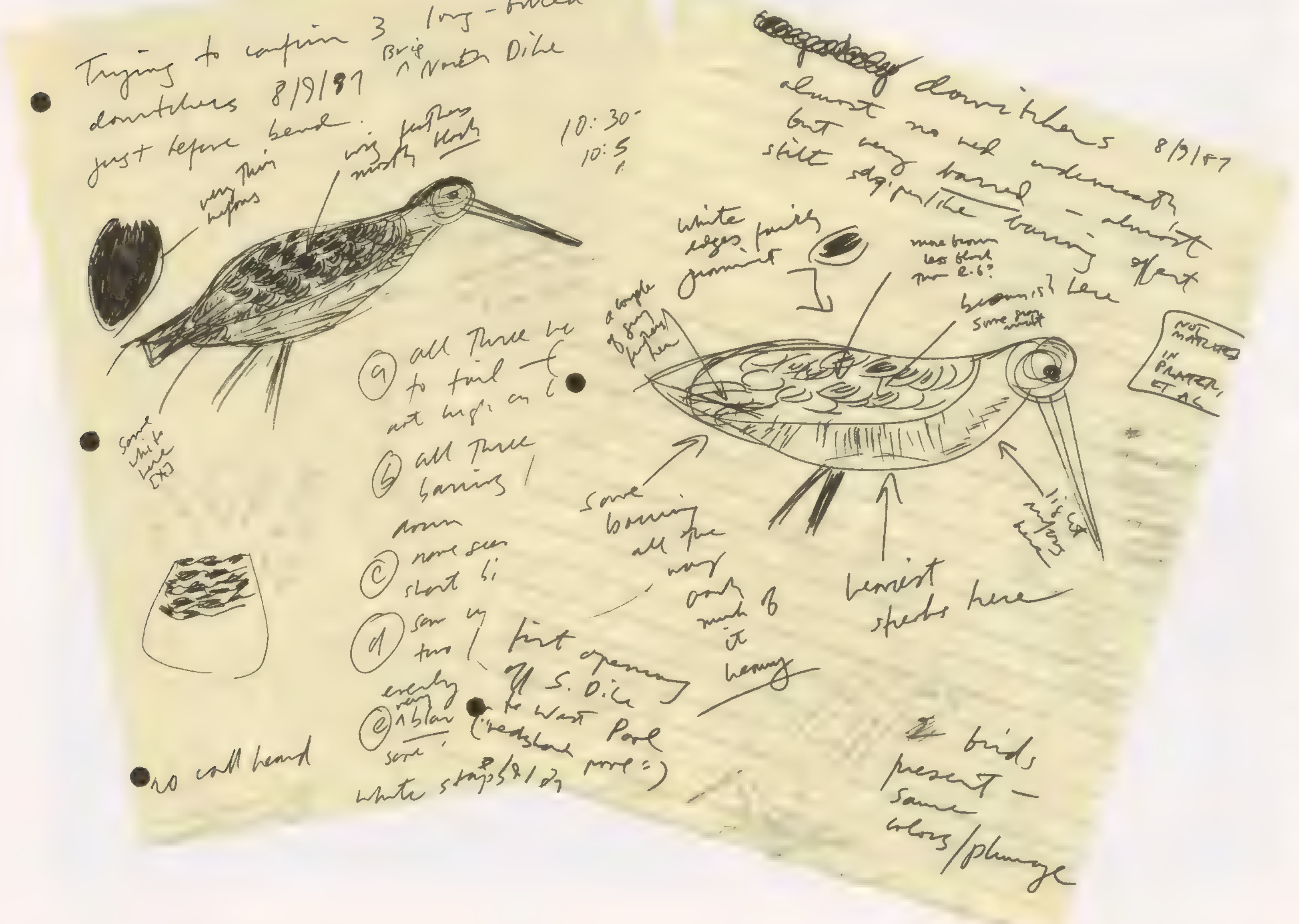
"We didn't bring one."

The bird ended the chase by circling down, landing on the water, and letting us catch up. Bob killed the engine, and we glided to within 25 yards. It had the yellowish cap and nape adult gannets show, but something seemed odd about the face pattern. Was it the eye? The iris seemed paler than it should have been. Aren't gannet eyes brighter than that? I asked myself. And that little stripe running back from the eye—had I ever seen a stripe like that on a gannet? Then I thought: *It's the bill!* The bill is silver-gray!

"Aren't gannets supposed to have yellow in their bills?" I asked Bob.

"I don't think so," he said, as the bird lifted off again.

We let it go and went back to Johnson's Shoals. It's a half-mile-long spit of land and should have been a wonderful place for a New Jersey birder on a March afternoon. Royal, Caspian, and Sandwich terns stood in clusters along the water's edge; Wilson's plovers and snowy plovers scurried over the dunes; a frigatebird soared overhead; a reddish egret danced in a tidal pool. I spent most of my time thinking about gannets, though—trying and failing to conjure up a sharp mental image of a gannet's face. I'd seen thousands of gannets. Why couldn't I remember what they looked like?



Trying to confirm 3 long-billed dowitchers 8/9/87 Brig North Dike just before bend
10:30-
10:5
wing feathers mostly black
some white here
ⓐ all three to tail at high on
ⓑ all three barring!
down
ⓒ none seen short
ⓓ seen in two first opening off S. Dike
evenly
ⓔ some white to West Pool
no call heard
~~[illegible]~~ dowitchers 8/9/87
almost no red underneath but very barred — almost stilt sandpiper-like barring effect
white edges faintly prominent
more brown less black
brownish here
a couple of gray feathers here
some barring all the way
heaviest spots here
NOT MATCHED IN PRATER, ET AL
2 birds present — same colors/plumage

Five long hours later, at Bob's office back on the mainland, I reached for the first field guide I saw on his bookshelf, Peter Harrison's *Seabirds*. Page 106 and plate 42 ended my struggle. It's the masked booby that shows the yellow bill. Gannets have silver-gray bills. So, the bird we'd seen had been the expected species: *Sula bassana*, the northern gannet. And I should have known.

Now, what's the moral of that story? Be prepared? Carry your field guide wherever you go? Don't lead your friends on wild goose chases? No, I'd claim the moral is: *Field guides dull the mind*. Richard Crossley, a British birder who has spent the last four summers in the United States, was walking down a forest path at Cape May Point one August day when he encountered a pair of American birders he knew—Joe and Joan we'll call them here—with their binoculars trained on a songbird high in an oak. The bird flew away as Crossley walked up.

"That" said Joe, "was a golden-winged warbler."

Crossley arched an eyebrow. "Really? What did you see on it?"

Joe shrugged and turned to Joan. "Let me have your field guide."

Joan handed over her Peterson. Joe flipped pages to the warblers' section and held the book at arm's length while he examined the golden-wing's picture for a moment or two. Finally, he tapped the illustration in three places, "It had this, this, and this." Then he slapped the book shut.

Crossley did not argue — just excused himself quickly and staggered away. To a British birder, confirming an identification by opening your field guide and pointing to a picture is a crass violation of the principles of good birding. British birders don't carry field guides in the field, even when birding in North America. When puzzled by a bird, they sketch it or record its field marks in their notebooks. The tough identifications are made at home — or not made at all.

"American birders need field guides," says Crossley, "because they are less competitive than British birders. British birders are more determined to prove they're competent. One doesn't want to be seen looking at a book every five minutes, so one studies the birds more carefully. American birders, by and large, are not so willing to work hard at identification."

Crossley is right about our overdependence on field guides, but I'm not sure it's because we're less competitive. I think that it comes from a certain anxiety, one that seems widespread on this side of the Atlantic. I see the same syndrome strike my eight-year-old son when he flips to the back pages of a puzzle book thirty seconds after encountering the puzzle. He can't stand being uncertain. The answer page beckons to him, as the field guide beckons to the confused birder.

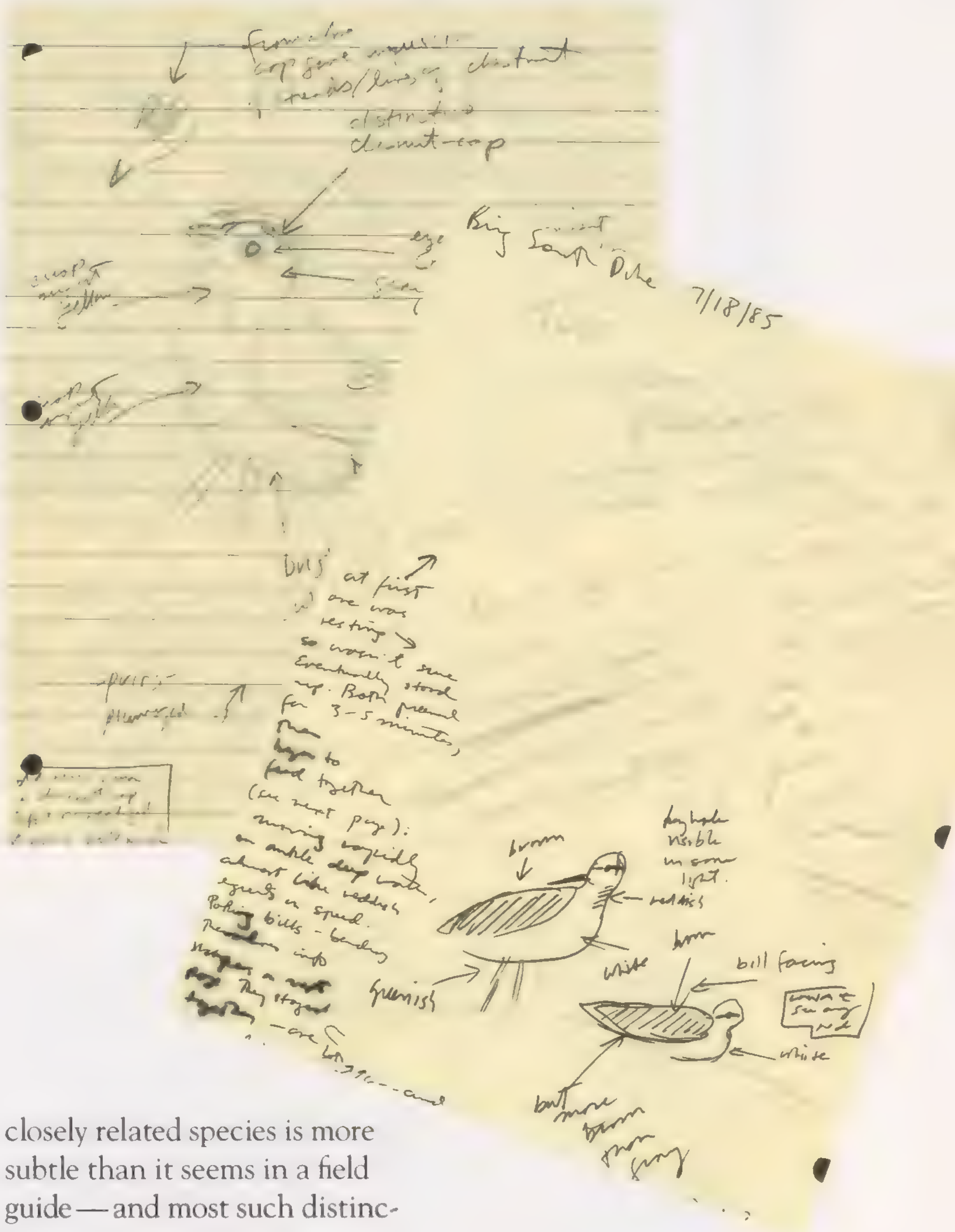
If a field guide had been on the boat during that gannet chase, I would have grabbed for it. That would have shown me that gannets don't have yellow bills (and boobies have more black in their wings), and ended my uncertainty in an instant. When next I encountered a possible masked booby, however, years from now, would I have remembered those marks? Almost certainly not. My inability to bring up a sharp memory of any of the thousands of gannets I'd seen before the one on Johnson's Shoals proves that. I'd never been forced to study a gannet closely, and so I couldn't really remember the critical field marks. If the color of a gannet's bill is now finally burned into my brain, it's because of those five hours without a field guide on hand. With no picture to turn to, I had to think.

"What you can't describe," Delaware birder Maurice Barnhill once pointed out, "you can't remember." Can you draw the head and throat markings of a chickadee, or the rump and tail pattern of a junco? For more of a challenge, try drawing from memory any of the following: the wing pattern of a cedar waxwing; the bill and mask pattern of a loggerhead shrike; the head and throat markings of a black-throated green warbler.

All birders fantasize about finding rarities — a Bohemian waxwing in New Jersey, a northern shrike in Arizona, a Townsend's warbler in Virginia — but the only preparation most of us make is the "I'll know it when I finally see one" strategy. Too often, we're fooling ourselves. We won't find what we've never seen because we don't know well enough the birds we have seen. When a distinction between two closely related species is more subtle than it seems in a field guide — and most such distinctions are more subtle — we are not prepared for it.

The American dependency on field guides generates still another problem. It makes learning field marks seem a tedious and boring labor. Staring at pictures of shrikes so that we might recall the mask pattern of a northern shrike when we encounter one at some unknown date in the future is passive and dull work. Far more satisfying is the British method: draw a picture of the next shrike you see on a telephone line. No, that won't turn a loggerhead into a northern, but it is a lot more fun than looking at a field guide picture. And since it leads you to an active engagement with the bird on hand, you will remember the field marks far more precisely.

Beginners shouldn't go into the field without field guides, of course. That would be like a first-time tourist wandering around a foreign country without a phrase book. I'm willing to bet, however, that most readers of this magazine are beyond that beginner's point. Most of us can identify most of the birds we see without a field guide in hand. Which means we should probably replace it with a blank notebook, and so take the next step toward self-reliance. — **Jack Connor**



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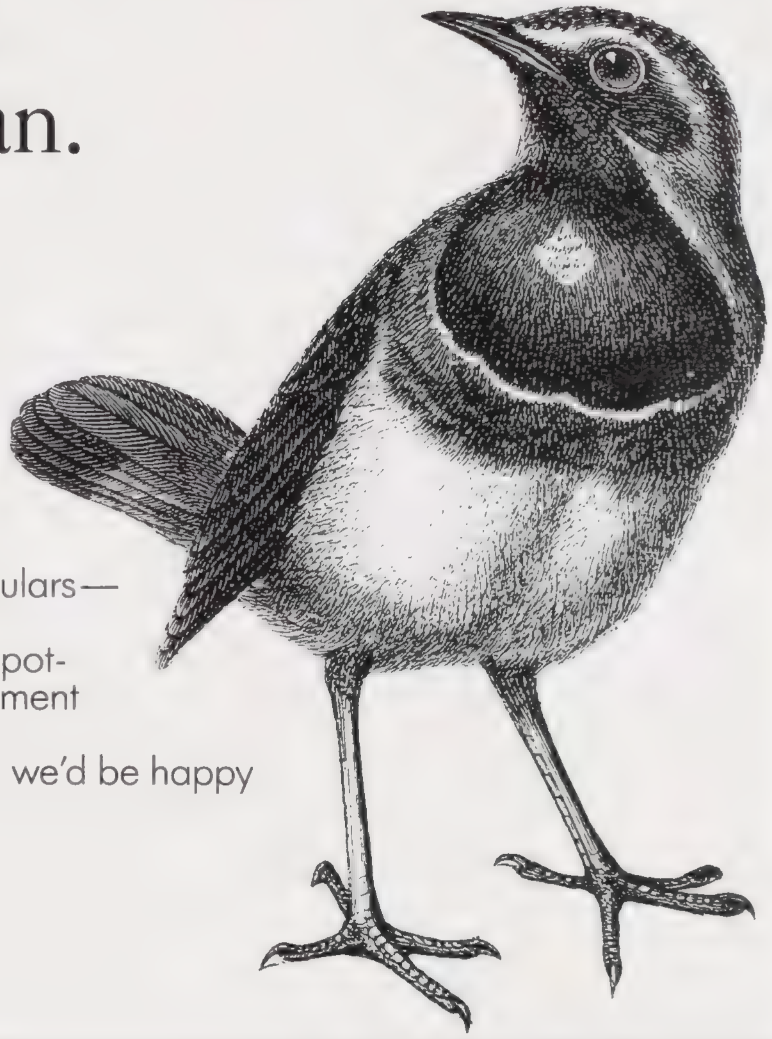

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THE LIVING BIRD

Quarterly

Autumn 1989

Louis Agassiz Fuertes.

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THE LIVING BIRD *Quarterly*

Cornell Laboratory of Ornithology Autumn 1989 Vol. 8 No. 4

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Front Cover: Watercolor of a crimson-collared tanager by Louis Agassiz Fuertes painted about 1903 for a planned work on Mexican birds. Note the careful composition; the bird's rounded silhouette is repeated in the palm trunk. Courtesy U. S. Department of the Interior.
Back Cover: Fuertes in his Ithaca studio, surrounded by souvenirs and artifacts from his bird expeditions. Courtesy Department of Manuscripts and Archives, Cornell University Libraries.
Right: Excited male red-cockaded woodpecker flashes his red cockade. The word "cockade" comes from the French, *cocarde,* meaning jauntily tilted hat; from Old French, *coquard,* meaning strutting; from Late Latin, *coccus,* meaning cock. Photograph by Julia Sims.

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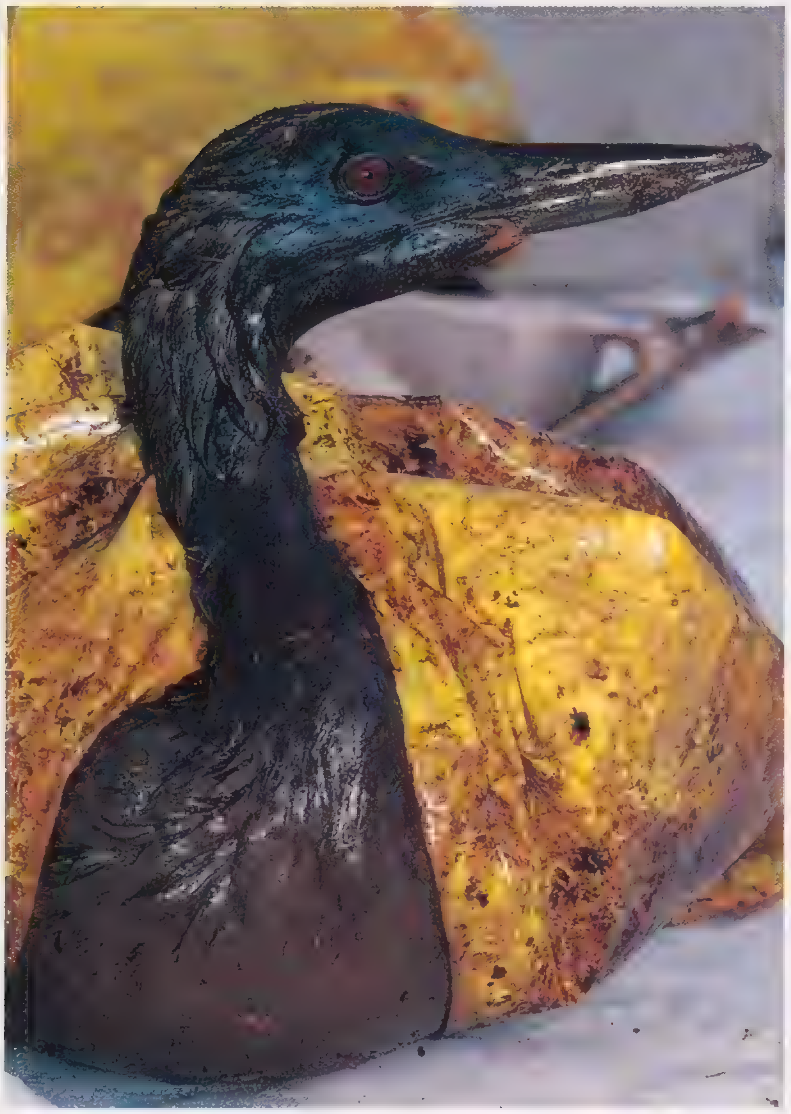
Never mind the faraway places with the strange-sounding names. This birder has a secret that no bird-finding guide will ever reveal.

p. 14 Unclear cutting


RICHARD HARTMIER

Oil-soaked loon

The death toll for shorebirds and waterfowl keeps mounting in the aftermath of the *Exxon Valdez* oil spill in southern Alaska's Prince William Sound. The Alaska Department of Environmental Conservation (DEC) has tallied over 28,000 birds that choked, smothered, or froze to death when oiled feathers could no longer insulate them. About 10 percent of the dead birds were waterfowl—grebes, mergansers, loons, and cormorants—60 percent were murres, and most of the rest were other alcids (birds similar to murres).

The DEC body count may represent as little as five percent of actual mortality since many carcasses have washed out to sea or have been eaten. The U. S. Fish and Wildlife Service (USFWS) estimates that from 100,000 to about 400,000 birds may have died since March 24, 1989, when the tanker *Exxon Valdez* ran aground on Bligh Reef and spilled almost 11 million gallons of Prudhoe Bay crude into Prince William Sound. The spill occurred just before the peak migration period, mid-April to mid-May, when over 20 million migratory shorebirds and waterfowl pass through the sound, the world's largest staging grounds for migratory shorebirds. But currents and wind moved most of the oil out of the sound, and there was little mortality among sandpipers, turnstones, and other migrants.

Populations of wintering birds, mostly scoters, oldsquaws, glaucous-winged gulls, and black-legged kittiwakes, may have been harder hit. Surveys conducted by the USFWS in past years typically showed over 300,000 wintering birds in Prince William Sound in the period from late March to early April. But in an aerial survey conducted one week after the spill, only about a third as many were present.

Besides the immediate deaths from exposure to oil, researchers expect long-lasting problems for bird populations. Studies of bald eagle reproduction are under way: over 150 bald eagles have died after eating oil-contaminated carcasses, and this summer, nesting is proceeding normally only in areas that completely escaped oiling. The Barren Islands population of murres has been devastated, and the few oil-contaminated birds that survive may not reproduce this year. The long-term effects of ingesting oil aren't known, but scientists estimate some populations may take seven to 15 years to fully recover.

The Denver Water Department's proposed Two Forks dam and reservoir upstream on the South Platte River in Colorado would threaten the water levels in the Platte River, Nebraska, an important stopover point for millions of migrating birds. The U. S. Army Corps of Engineers has granted a permit for Two Forks, which would provide water for the Denver metropolitan area.

Because of the controversial nature and environmental effects of Two Forks, Environmental Protection Agency (EPA) Administrator William Reilly initiated a review of the project in March 1989. The few times the EPA has chosen to review a Corps-permitted project, the agency has usually vetoed it, hence the widespread belief that Two Forks will be vetoed.

Under the Clean Water Act, the EPA has the authority to review permits issued by the U. S. Army Corps of Engineers.

Meanwhile, down river in central Nebraska, 500,000 sandhill cranes, along with endangered species such as whooping cranes and almost nine million waterfowl, pause to feed and roost on the Platte during their seasonal migration.

Another bird has been added to a lengthening list of victims of the illegal wild pet trade, according to Bronx Zoo Curator of Ornithology Donald Bruning. Spix's macaws haven't been seen in their native Brazilian forest habitat for over a year. Charles Munn, a research biologist at the zoo, says he is reasonably certain this blue macaw is extinct in the wild.

Trappers systematically remove macaws and parrots from their nesting trees, which are found in dense forests. Spix's have been sold by dealers in the last few decades, enough, in fact, to constitute a population.

The United States is the biggest customer for all types of macaws, with more than 3,000 entering the country each year; however, the birds are in demand elsewhere. In 1987 a Paraguayan dealer offered two Spix's to a West German aviculturist for $40,000.

Although the Convention on International Trade in Endangered Species (CITES) treaty forbids export or import of endangered species, populations of macaws and other parrots throughout the world have been decimated because of the high demand for these colorful birds. It's estimated that 30 percent of the 145 parrot species living from Mexico to Argentina are in danger of extinction.

The Spix's macaw is not dead yet: 40 birds are still alive in captivity. Unfortunately most of them are owned by private collectors who have declined to participate in breeding programs.

The king of bird listers has been dethroned, according to the keeper of official lists. Figures published by the American Birding Association indicate that Harvey Gilston of Switzerland has seen 6,514 species of birds, surpassing the 6,364 seen by Norman Chesterfield of Ontario.

Approximately 9,000 bird species are known to exist in the world.

The Madagascar serpent eagle was last seen in 1930 when two specimens were collected from the dense rainforests of Madagascar, an island off the eastern coast of Africa. Since then, much of the eagle's habitat has been destroyed. But in September 1988 members of the Cambridge Madagascar Rainforest Expedition sighted the eagle in a river valley in the Marojejy Reserve.

As its name suggests, this eagle eats mostly snakes, and its head is topped by a curious hood of long feathers, but little else is known of its behavior, anatomy, or ecology. Habitat destruction continues even in the supposedly protected Marojejy Reserve, where slash-and-burn agriculture is a constant problem. The International Council for Bird Preservation predicts that the rediscovery of the Madagascar serpent eagle will lead to increased conservation activities in the reserve.

The northern spotted owl will soon be officially proposed for threatened status under the Endangered Species Act. On April 26, 1989, the USFWS presented to the U.S. District Court in Seattle its finding that the spotted owl warrants federal protection, setting in motion the process by which a species is added to the federal list. Listing the owl means extending that protection to many other animal species that depend on the majestic old conifers where the owl lives, and to the forest itself.

The move to list the spotted owl signifies a victory for the coalition of 25 environmental groups that filed suit against the USFWS early in 1988, charging that the agency acted "arbitrarily and capriciously" by deciding in December 1987 that the owl did not warrant listing and that populations could be maintained through wildlife management techniques.

In November 1988, Judge Thomas S. Zill of the Seattle district court ruled that USFWS had acted illegally in refusing to list the owl. He also ordered the service to reconsider and issue a new decision.

The spotted owl, with a population of about 5,000 individuals, is already listed as endangered in the state of Washington, as threatened in Oregon, and as a "species of special concern" in California. But most owl habitat is on public lands managed by the USDA Forest Service, which isn't regulated by state law and which leases much of its land to the timber industry.

Old-growth conifers are worth about $4,000 per acre to the timber industry, but if the spotted owl makes the federal list, the Forest Service would be prohibited from selling timber leases in its habitat. Industry representatives have charged that if they are prevented from cutting old-growth forests, there will be timber shortages and unemployment at local sawmills.

Environmentalists respond that local mills would have plenty of business if the industry used these mills instead of exporting whole logs to Pacific Rim countries.

Some scientists have dubbed the spotted owl an indicator species: as the owl goes, so goes the ecosystem. But the northern spotted owl is more than the environmentalist's equivalent of a canary in a mineshaft. As biologist Daniel Simberloff eloquently argues in his review of the Forest Service's spotted owl management plan (*Condor*, vol. 91, 1989), "this secretive bird's fate has come to symbolize the United State's struggle to maintain a modicum of pristine habitat in the face of burgeoning populations, a true dilemma for a nation with a strong entrepreneurial spirit and roots in the Judeo-Christian ethic of human exploitation of nature."

A Guggenheim Fellowship has been awarded to Katharine Payne, a research associate in the Lab's Bioacoustics Research Program, for her work on the infrasonic calls of elephants. Payne and collaborators William Langbauer and Joyce Poole showed that elephants use infrasonic calls, sounds pitched too low for human hearing, to coordinate their behavior across the vast African veldt.

The prestigious Guggenheim awards honor both achievement and the promise of future achievement in a broad range of academic, scientific, and artistic fields. Payne is one of only 198 fellowship recipients from a pool of 3,144 applicants in 1989.

Dr. Francis G. Scheider, good friend and member of the Lab since 1963, died May 19, 1989, in Syracuse, New York. He was 57.

A graduate of the State University of New York College of Medicine, "Fritz" set up his North Syracuse pediatrics practice in 1964. He was a diplomat of the American Board of Pediatrics and a member of the American College of Pediatricians.

Those who attend the Lab's Monday night seminars knew Fritz as the astute birder in the back of the room who always shared his sightings. He also contributed to the Lab quietly, behind the scenes. His help was crucial in completing the New York State Breeding Bird Atlas, and he regularly contributed bird records to the Lab's databanks.

In addition to the Lab, Fritz was involved in New York State bird and conservation programs, and was a regular conductor of USFWS Breeding Bird Surveys. He exemplifies the volunteer who makes significant contributions to ornithology. We will miss him.

An endowment fund has been established at the Lab in Dr. Scheider's honor, to further the Lab's research and conservation efforts. Please contact Scott Sutcliffe at the Lab to contribute to this fund.

The Plains of the Sky

It may have been October; it may have been April. I forget which. I remember I was craning my neck, looking overhead in hopes of finding wavy lines of migrating snow geese. I also happened to be standing in a line of humans at a shopping mall, waiting for a bus that would take me from Connecticut into New York City for the day, and I was wearing a coat and tie and carried an attaché case. After a few minutes I had a sort of out-of-body experience: I became aware of the image of myself, the only upturned face in that small crowd of strangers in front of the smoke shop where bus tickets were sold.

At the same instant I realized that I possessed a perspective that greatly enlarged the world around me. We humans have domesticated and uglified many horizons in this world, but because I happen to be tuned to birds I always have thousands of cubic acres of wilderness above me to explore with my eyes and ears—an airy Serengeti, a Great Plains of the sky.

My, what pictures of life in those plains I carry in my mind. Nighthawks bounding and darting on the air, their shapes dominated by sharply angled long wings; hundreds of nighthawks tossing past on migration; dozens—mostly just shadows or raspy voices—feeding on insects above a city at night; a lone displaying male plummeting toward his mate's ground perch in the South Dakota Badlands and pulling out just a wing length above the butte with a loud boom of air against flared flight feathers. Or migrant double-crested cormorants, by ones or by scores, towering up on thermals, stiff-winged crosses endlessly circling and rising, circling and rising, finally pointing themselves in what looks from below like the right direction, then beginning to move on but stopping to circle again after sailing only a few yards, as if baffled about the proper heading, and repeating the process until they gradually wander out of my sight.

NASA

The planet as a whole thing, wavy lines of snow geese as a symbol.

Snow geese remind us that the plains of the sky form a sphere that envelops the entire world as it spins in endless space.

I hold in memory the minute of a winter day beside the ocean when a few friends and I caught sight of a flying American kestrel; as we watched the little hawk through our binoculars it dove, and in our fields of view unexpectedly appeared a soaring harrier, the target of the dive. The harrier stooped in its turn, and following it down we found the harrier's target, also unexpected, a snowy owl perched on the tip of a white pine.

I see summer sunset skies where chittering dozens of small chimney swifts, bow-winged, in long, graceful arcs chase swarms of high-flying insects. End-of-summer skies in which hundreds of broad-winged hawks suddenly appear in swirling thermal-riding flocks and westward-gliding battalions; they are visible overhead for a few minutes each, obvious to anyone who looks for them and invisible to almost everyone else, and then are gone, bound for the forests of Central and South America. Winter skies, from which fall the brassy calls of evening grosbeak flocks and the high, sweet trills of cedar waxwings and the tinkling notes of horned larks passing from one manured cornfield to another. Spring and autumn skies across which weave the barking, sun-glittered skeins of snow geese, trading between Arctic nesting grounds and winter havens along the middle Atlantic and southern coasts of North America.

Do such ties of the heart to the plains of the sky have any significance, besides providing me and other birders with entertainment and small adventures? I believe they do. Think of the sort of awareness the ties promote. Those snow geese, those broadwings, those evening grosbeaks, moving over the face of the planet in response to seasonal fluctuations in temperature and food supplies, symbolize the planet as a whole thing. They remind us that the plains of the sky form a sphere that envelops the entire world as it spins in endless space. They link south with north, ice-melt pools on the tundra with neotropical marshes, subarctic and temperate deciduous woods with tropical jungle, vast Canadian spruce realms with patchy mixed forests in the American megalopolis.

The human community is clearly not ruled by a macro-vision of the planet, like a bird's view of it in flight, but perhaps we would treat our environment with great solicitude instead of with greed and disdain if we developed such a macro-vision. The plains of the sky also symbolize the spectacular, miraculous variety of life on earth. If the human community—not just a few of us naturalists—were fully con-

JEN AND DES BARTLETT (BRUCE COLEMAN LTD.)

scious of this variety, that awareness could also help change our species' relations with the planet.

Such awareness means being able to identify the snow geese and the broad-winged hawks and the evening grosbeaks overhead, as well as the myriads of bird species in the trees and on the ground. Names, identities, unlock the doors to man's accumulated knowledge of the fascinating complexity in the fabric of life on Earth. You can read up on snow geese, for example, in the works of Arthur Cleveland Bent and Ralph Palmer, and after that when you see a sinuous line of migrating snow geese high overhead you also see immeasurably more, because now you have them in their context—where they've come from and where they're going and how they live and what hazards they face on the planet they share with us.

You also have them in *your* context. The birds you know by name when you see or hear them are reference points by which you can locate and define yourself in the world. Like photographs of beloved childhood homes and old school friends and vacation cabins, they affirm and connect who and what and where you are and where you've been. That's true, potentially, about all kinds of living things; my wife Mary has little aptitude for birds but has an amazing knowledge of wildflowers, and they are checkpoints for her in time and space.

If as a species we habitually locate and define ourselves in terms of other life forms, we are far more likely to treat kindly those life forms and the place we share in space than we would if we did not have such reference points.

Had I seen snow geese that morning at the bus stop, I would have pointed them out and named them for the benefit of all within earshot. Our species has been "civilizing" itself for thousands of years, and it still is. That process means withdrawal from direct contact with most of nature—withdrawal that includes outright destruction of the environment and of many fellow species. In the developed countries, where *Homo sapiens* is presumably most civilized, being farthest removed from nature, most individual humans do not notice much if any of the natural world these days. If we're going to change our species' connections to the planet, we who are already converts to conservation must proselytize vigorously to restore mankind's ancient, precivilized awareness of our co-planetarians. Among the good places to start are the plains of the sky over all our heads. —**Michael Harwood**

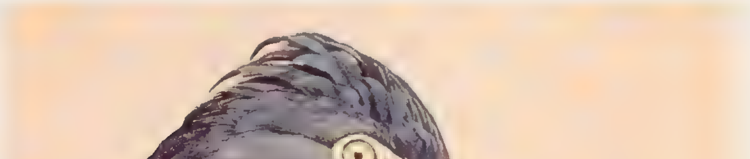
THE HANDS OF AN ANGEL

Frederick G. Marcham

In the world of art, the painting of birds has flourished from ancient Egypt until the present day, and in that world some 70 years ago, American ornithologists regarded Louis Agassiz Fuertes as the leading artist. In America today those who know birds and enjoy the painting of them still look to Fuertes as the master.

Fuertes was born February 7, 1874, in Ithaca, New York, the sixth child of Professor Estevan Antonio Fuertes and his wife Mary Perry. The professor taught civil engineering at Cornell University and gathered around himself and his wife a lively family much given to playing instruments and choral singing. Louis himself sang and played the flute and violin. He had a precise ear for natural sounds and in time he came to recognize and exactly repeat hundreds of bird songs.

Fuertes perfected a vigorous style, which brought together both attitude and movement in what he described as "the personal look of the bird." Black-headed heron, right; lesser bird of paradise, far right.

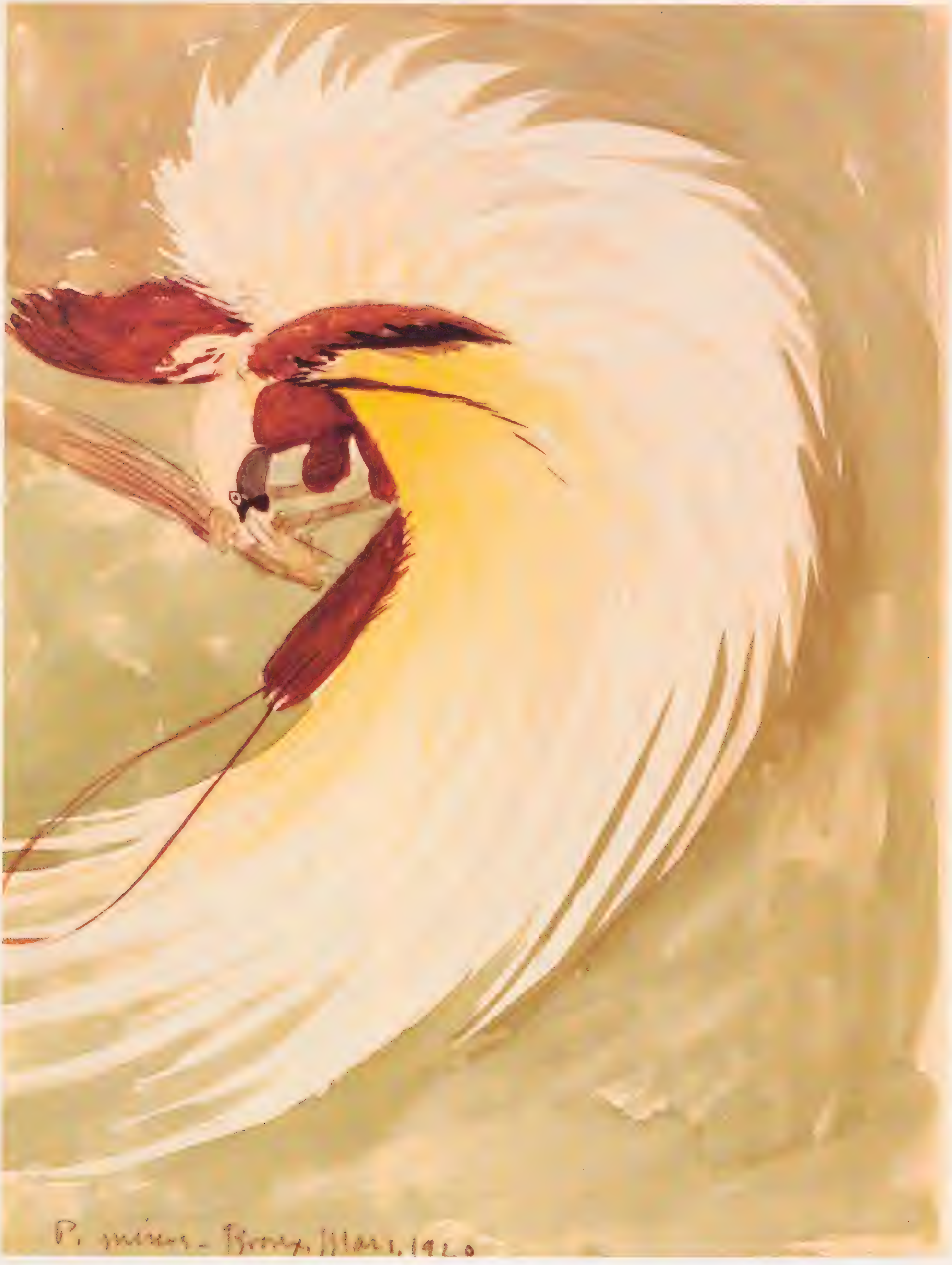


At the age of 10 he began keeping written records of the birds he saw: their movement, migration, their food and nesting. The records were complete, but they lacked a picture of each bird and so, at 14, he taught himself to paint birds. He had already studied Audubon's *Birds of America* in its elephant folio in the Ithaca Public Library, and with Audubon to guide him and his own skill in painting, his work won the support of ornithologists at Cornell University who arranged a public exhibition of it. Fuertes was 20.

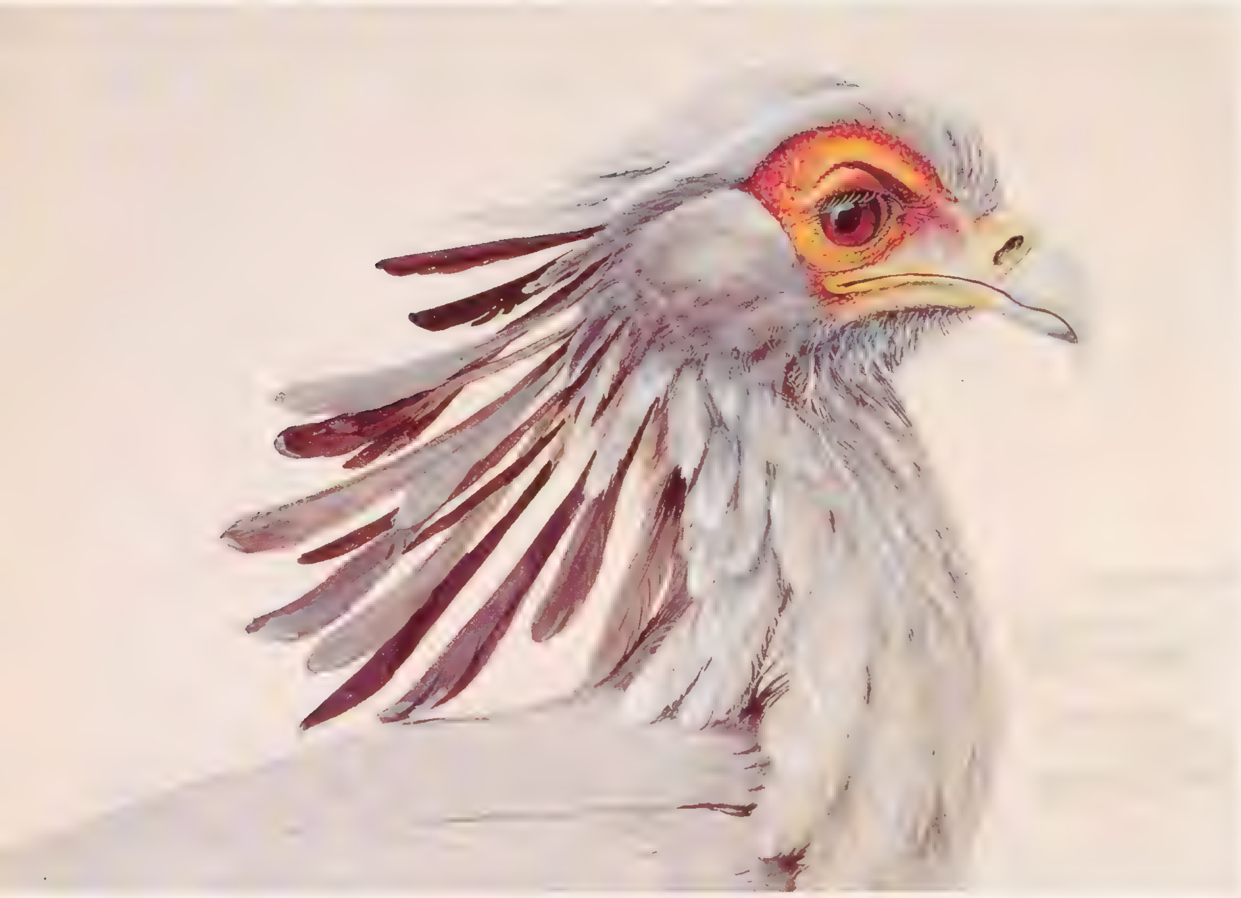
He was by now a student in Cornell's College of Architecture, where in 1895 a fellow student asked Fuertes to come with him to Philadelphia and show his paintings to his uncle, Elliott Coues, one of the leading members of the American Ornithologists' Union. When the union met in Philadelphia that year, Coues arranged an exhibition of the paintings and spoke of the artist's work to the members, who gave the paintings high praise. In 1897 Coues made a formal judgment to ornithologists: "I say, with a full sense of the weight of my words, that no one can draw and paint birds as well as Mr. Fuertes, and I do not forget Audubon himself when I add that America has not produced an ornithologist artist of equal possibilities."

Coues asked Fuertes to illustrate a book called *Citizen Bird,* which he and Mabel O. Wright wrote. By 1897, when Fuertes received his A.B. degree in arts and sciences, he had already illustrated three books. *Citizen Bird* alone had 111 illustrations.

In 1896 Fuertes met a painter, Abbott Thayer, whose training had been in France, but who in his middle years had become a prominent figure in American artistic life. Thayer heard Fuertes discuss the coloration of birds at the AOU meetings. Later, learning



P. minor – Bronx, 11 Mar., 1920



The works painted by Fuertes on an expedition to Ethiopia in 1926–27 include this secretary-bird with gracefully streaming, finely detailed plumes. Below, the artist as adventurer (left) in Florida with mentor Abbott Thayer (far right).

that Fuertes was an artist and having seen Fuertes's pictures, he said, "yours are the true thing ... half my life and passion is birds and pictures of them." Fuertes accepted Thayer's offer to take artistic instruction, and from 1897 to 1900 Fuertes lived for long stretches with the Thayer family near Dublin, New Hampshire.

Before, Fuertes had studied and improved on the work of Audubon. He painted more precisely the color of the birds and the attitude of their bodies. Now, with the guidance and encouragement of Thayer, he developed his own vigorous, brilliant style which brought together the attitude and movement and eyes of the bird into what he called "the personal look of the bird," a forceful, living presentation which no earlier bird painter had achieved.

By 1900 he was making his living as a professional artist and student of birds, the first American to accomplish this. Fuertes kept in his studio hundreds of his paintings and drawings, referring to them as a scholar might refer to his notes. A pencil sketch, a more complete drawing, the study of a foot, perhaps a watercolor; he had a dozen of these for any bird he had worked on in the field and these, along with the bird skins he had prepared or borrowed, were the library to which he turned as he made the finished illustrations for such works as *The Birds of New York State* and *The Natural History of Ducks*. They remain today the best of their kind.

My memories of Fuertes center around the 1920s when he was a person prominent in the life of Ithaca, New York, and was known for his paintings to many throughout the United States. Dr. Livingston Farrand, president of Colorado University, on being invited to become president of Cornell, said he knew two things about Ithaca: it was the home of Cornell University and of Louis Fuertes. By the time I met him, Fuertes had worked for 20 years in his crowded studio, with door ajar, and Ithaca friends and school children coming in and out, visiting. Cornell alumni who returned to Ithaca sought out Fuertes, remembering the songs he had sung at student gatherings and alumni reunions. Ithacans knew him for his comic lectures, one of which was on the art of snoring. To Boy Scouts he was a leader who took them on bird walks. As he passed the time of day with the visitors to the studio Fuertes worked at his easel.

Life in Ithaca was interspersed with journeys to parts of America, in particular to Alaska, to Europe, South America, and to Africa, most notably Ethiopia. His usual companion was Frank Chapman, editor of the ornithological magazine *Bird Lore*, and the two of them covered 50,000 miles of forest and plain. They traveled as representatives of leading museums in the United States, for whom they studied birds and shot and skinned them. Fuertes ended each day by painting some of the birds he collected. In Ethiopia, for example, in 1926 and 1927, day by day he spent a morning and afternoon in the field and then walked back to camp to skin and pack his birds. After a wash and supper he painted four or five of them. Half an hour was enough for a single portrait.

Watercolor drawings of the kind he made from 1898 throughout his life, and the pencil sketches he made in the field as a preliminary to the portraits, for me and many admirers of Fuertes display his artistic skill at the height of its mastery.

His first step in painting birds was to take into his mind and senses the bird before him. Vernon Bailey, chief field naturalist of the United States Biological Survey, went with Fuertes to Texas in 1901 to study mammals and birds. He told of this encounter between Fuertes and a quail: "One morning at sunrise, in our base camp in a gulch of the Chisos Mountains,

Left, top, courtesy Field Museum of Natural History. Left, bottom, courtesy Department of Manuscripts and Archives, Cornell University a Mearns' quail came and sat on a rock and preened and strutted and spread its hooded crest within four or five feet of his nose. When it had gone he burst out of his sleeping bag and fairly danced with joy as he ran for pencil and paper and worked for an hour on sketches of the quaint bird."

When Fuertes spoke of his work he began by referring to himself in the third person, as "the boy." "It was not the natural ability to draw which established the boy in the painting of birds, but rather the opposite," he said. "His desire to learn accurately developed him in his crude and unlearned handling of his medium."

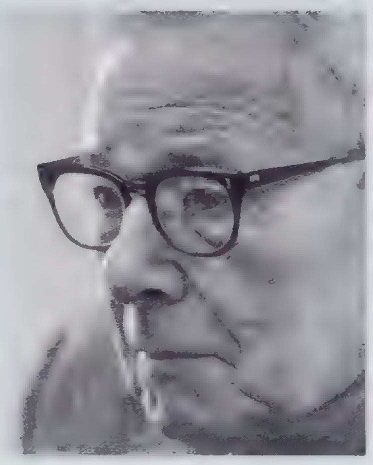
From childhood he had taught himself the bodies and feathers of birds, until he could say without contest, "I have been longer a student of the comparative anatomy, appearance, and general personal looks of the birds themselves and have spent a larger proportion of my time since boyhood on the direct study of birds and have seen more widely varied types in life than almost anyone I know.

"The one fundamental, basic prerequisite of all art, particularly naturalistic art, must be good, sound, deep and appreciative knowledge," he said. Next in importance was the awareness of color. The beginning student, declared Fuertes, must know, "the actual, local color of objects and elements and the color reflected from lighted parts on to shaded parts." These things the student was not to "behold" or "observe," like objects that flash before his eyes in a momentary impression, but to "see" to the full extent of his "visual capacity," the structure, the color, the relation of part to part drawn together by him into a single artistic unity. From the depths of what the artist had seen he must "work without stint to put them together on paper or canvas." This advice he gave to young artist Keith Williams in 1922, and to all the young persons who wrote to him and came to see him asking for help in the painting of birds.

Fuertes worked without stint to that day on August 22, 1927, when he died as his car was struck by a passing train. He had left in his studio 3,000 of his drawings and sketches, and these made it possible to reconstruct the day-to-day life of the artist. He began his morning with half a dozen preliminary sketches and from them he made the finished work, perhaps a formal watercolor for a book. His drawings and paintings were included in 50 publications whose range spanned William Beebe's *Monograph of the Pheasants*, T. Gilbert Pearson's *Herons of the United States*, part of *The Birds of Massachusetts and other New England States*, scores of bird magazines, and seven publications for the National Geographic Society.

From year to year individual collectors commissioned him to paint large bird pictures, and today these can be found in museums and private homes throughout the United States. Fuertes had in mind these large paintings when in 1925 he said to Roger Tory Peterson about his just-completed paintings of a

THE HEART OF AN ANGEL



Frederick Marcham

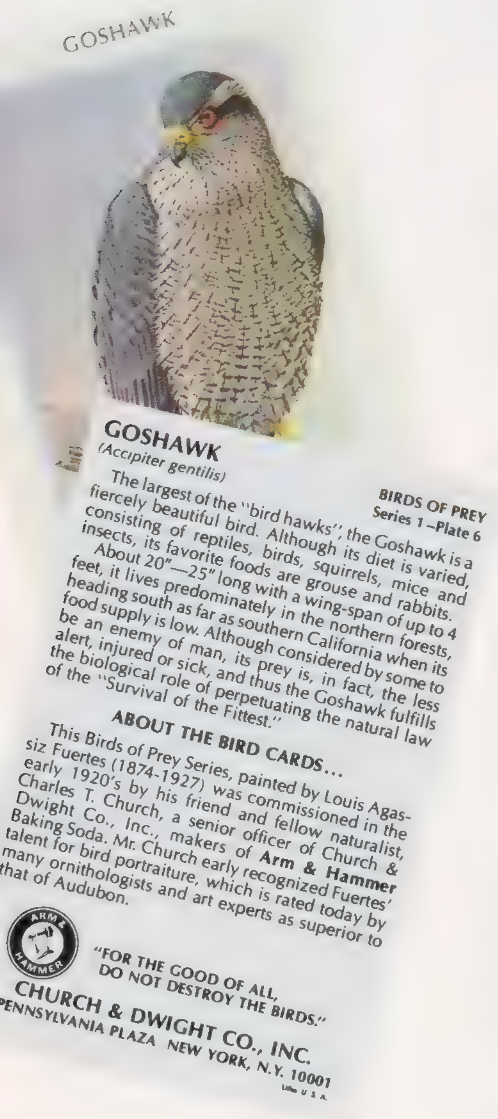
Louis Agassiz Fuertes, my grandfather, died 10 years before I was born. On the walls of our old farmhouse near Ithaca, New York, hung his sketches — skunks, weasels, a barred owl, a barn owl, a blue heron, two chickadees, and a rat — all vividly alive except the rat, who hung soft-bellied and utterly dead in the talons of a raptor. As vivid as those sketches were my mother's stories of her father. In my childhood days she would reminisce while transcribing his letters; funny, tender, thoughtful, and sometimes ecstatic, they filled my life with memories that became almost my own. I longed to know this naturalist and artist who had such powers of observation and such a heart.

As much as a wish like this can ever be granted, mine has been granted. The three biographers who chose to write about my grandfather — my mother, Mary Fuertes Boynton, Robert McCracken Peck, and Frederick Marcham — held in esteem not only Fuertes's work but the man himself. Through their books the beauty of my grandfather's life and work has been recognized, shared, and preserved.

One of the three books, *Louis Agassiz Fuertes and the Singular Beauty of Birds* by Frederick Marcham, contains not only myriad sketches and letters, but also exquisitely reproduced paintings. The author weaves together letters, sketches, and paintings in such a way that a whole man emerges — his perception and genius and love for nature and people.

Reading Marcham's book one recognizes in the biographer as well as in his subject a great love for nature and a keen eye for art. Then it is no surprise to learn that during many of his years as a professor of history at Cornell University, Professor Marcham used Fuertes's letters and paintings as object lessons in careful observation.

Like Fuertes, Marcham has spent most of his life in Ithaca. Here his generous influence is felt everywhere. It is felt in the classrooms where for 64 years he has been a beloved teacher. It is felt in Cayuga Heights where he was mayor for 32 years, and in the Cornell athletic department, where he coached boxing for 20 years. It is felt in the local hospital where the bird paintings he donated cheer anxious visitors and weary patients in the waiting rooms. And I feel it in my heart when I think of his gift to me in bringing my grandfather and his work to life, for me and for future generations. —*Katharine Payne*



GOSHAWK

GOSHAWK
(Accipiter gentilis)

BIRDS OF PREY
Series 1 –Plate 6

The largest of the "bird hawks", the Goshawk is a fiercely beautiful bird. Although its diet is varied, consisting of reptiles, birds, squirrels, mice and insects, its favorite foods are grouse and rabbits. About 20"—25" long with a wing-span of up to 4 feet, it lives predominately in the northern forests, heading south as far as southern California when its food supply is low. Although considered by some to be an enemy of man, its prey is, in fact, the less alert, injured or sick, and thus the Goshawk fulfills the biological role of perpetuating the natural law of the "Survival of the Fittest."

ABOUT THE BIRD CARDS…

This Birds of Prey Series, painted by Louis Agassiz Fuertes (1874-1927) was commissioned in the early 1920's by his friend and fellow naturalist, Charles T. Church, a senior officer of Church & Dwight Co., Inc., makers of **Arm & Hammer** Baking Soda. Mr. Church early recognized Fuertes' talent for bird portraiture, which is rated today by many ornithologists and art experts as superior to that of Audubon.

"FOR THE GOOD OF ALL,
DO NOT DESTROY THE BIRDS."

CHURCH & DWIGHT CO., INC.
PENNSYLVANIA PLAZA NEW YORK, N.Y. 10001
Litho U.S.A.

Left, courtesy Church and Dwight Co. Inc.

great horned owl in a trap, "This is the way I really like to paint. I'm going to do more of it from now on." In his paintings and drawings, large and small, he presented the bird in all its vividness. To see the bird alive and in action, look at his illustrations of Narina's trogon, the chestnut-eared ariçari, and the great blue heron. His rendering of the curly-crested helmet shrike, the secretary-bird, and the breast and underwing of the magpie-jay show his grace in using watercolor for the texture of the bird's feathers. He had the hands of an angel.

In addition to this great gift he had another. Fuertes wrote with such skill that of all the novelists and prose writers in the United States in the early 1900s he stood among the best for his ability to picture in words lively descriptions of the scene before him and to express the emotion it created in him. The clarity of his words and thoughts echoes the clarity of his brush strokes.

Hundreds of his letters still exist at Cornell, including letters to his wife Madge, which he sometimes scratched out in a jungle tent, candle flickering. To her he wrote an eight-page letter one night, February 22, 1913, from Monte Redondo in Colombia. A sentence or two says all about his literary style:

> "Along the trails bare little farms, built so steep they look like maps of farms on the wall. They harbor and faintly nourish a scattered people, the poorest in every conceivable sense, I think, in the world. They know of nothing truly. They can hardly think at all and stand in a blurry daze while you pass them, and probably for hours after. I have never been so touched by what man, God's creature, will do and do without to live bare life as here in these sad, huge, resourceless desolations of the eastern Andes."

These descriptions — the things seen, the scattered people, his own emotional shock, and the "desolations of the eastern Andes" — these words are the cry of a person called to speak out, to write with the same force with which he painted.

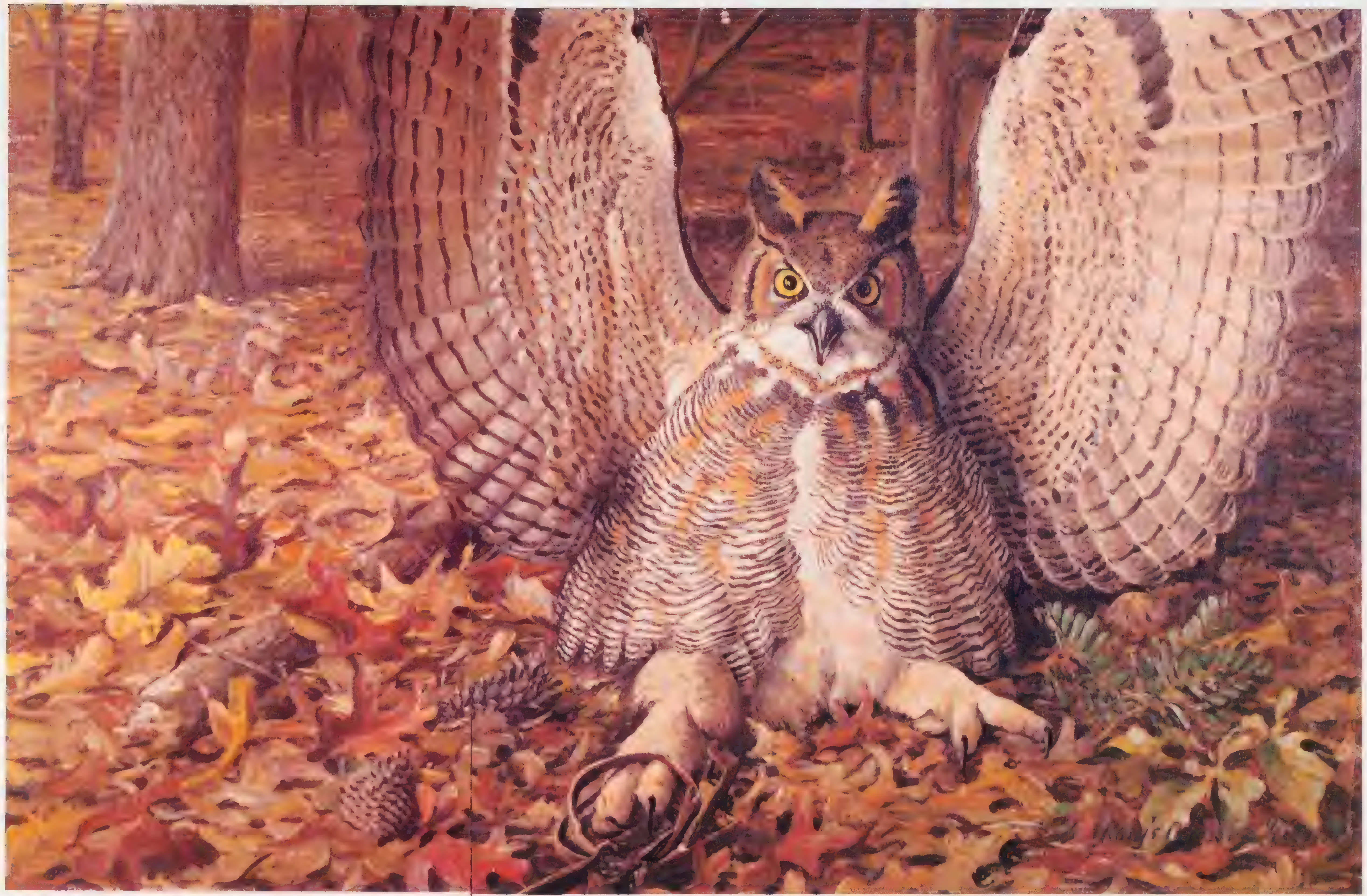
When he died in his 54th year he had already given to bird study in the United States new standards of knowledge and appreciation. His work was widely known, for he had illustrated scores of cards with bird pictures, and these, inserted in packages of ARM & HAMMER® baking soda, were found in almost every home. Children collected them. The books he illustrated were in many library collections. Leading museums displayed his works, and in the homes of the wealthy his portraits of birds were cherished.

Fuertes was a leader, with Frank Chapman and others, in the vast expansion of the popular study and enjoyment of birds that occurred in the early 1900s. What he drew and painted put before the public the knowledge of the bird as a natural creature — its form, its color, its movements — and, by the grace of Fuertes as an artist, called up a sense of the beauty he had experienced in painting it.

Fuertes was above all things an ornithologist from his earliest days to his death. Hundreds of different kinds of birds he knew: their anatomy, their colors, their mating habits, and the rest. His studies in North America and his visits to other continents established his scientific credentials.

He was a gregarious man, fond of company, and he was a gentleman. One day I asked a woman who was a child when she had known him, what memories she had of him. She said that on an afternoon, as she rode the Ithaca street car, she was worried because she had to attend a birthday party in a few hours, but had no present to give. Fuertes, who knew her well, was riding in the car, caught her face, and came to ask why she worried. She told him. "Get off this car at my house," he said, "and I'll paint a bird picture for you." ☐

The Cornell Laboratory of Ornithology houses a large collection of Fuertes art. Visitors to the Lab are welcome.



Cornell Laboratory of Ornithology

"This is the way I really like to paint," he said of the great horned owl, left, a gift to his Cornell fraternity, Alpha Delta Phi. Below, a sage grouse.

Courtesy American Museum of Natural History

BHL

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FEW AND FAR BETWEEN

Michael R. Lennartz and Peter W. Stangel

It's an old saw—no trees, no birds—and so it goes with the red-cockaded woodpecker, a species that once flourished in a South lush with broad belts of mature old pine trees. Today, the relatively few birds that remain live in the last isolated fragments of old forest.

LEFT, C. C. LOCKWOOD. RIGHT, KEVIN ADAMS.

In a remote site along the Savannah River south of Aiken, South Carolina, the Department of Energy (DOE) operates the Savannah River Site (SRS), a facility that produces nuclear materials for national defense. This story, however, is not about problems between birds and the nuclear industry. Its focus is on the efforts of a University of Georgia geneticist and a USDA Forest Service biologist to develop a strategy for restoring a population of woodpeckers on the edge of extirpation at SRS.

The year was 1985 when Peter Stangel, a university geneticist, and I, a habitat biologist, met with SRS environmental coordinators. The Department of Energy, a geneticist, and a habitat biologist might seem like an unusual coalition to be working together on woodpecker conservation, but the plight of the red-cockaded woodpecker at SRS demanded an unusual approach. The bird's future at SRS was bleak. The population had been declining for at least a decade: at the point where we stepped in only five birds remained.

The red-cockaded woodpecker is not only in trouble at SRS. It is classified by the U.S. Fish and Wildlife Service (USFWS) as an endangered species throughout its range. Under provisions of the Endangered Species Act, DOE as a federal agency has to manage and protect the species on its property. DOE had been concerned about the red-cockaded population at SRS for some time, but previous attempts to help the bird had not been effective in halting a ten-year slide. DOE wanted Peter and me to reevaluate its conservation efforts and to devise a plan, not just to save the remaining five birds, but to restore a population that would be large enough to sustain itself without human intervention.

Peter and I knew that for SRS to support a large, healthy population of red-cockaded woodpeckers, the only long-term solution was to increase the number of mature pine trees there. Red-cockadeds excavate nesting cavities only in living pines that are 85 or 95 years and older and infected by heartrot, a disease that softens the trunk, thus making it easier to peck out a cavity. The primary threat to the entire species is an extreme shortage of these trees.

Agriculture and logging in the late 1800s and early 1900s eliminated the virgin pine forests in the South. By the time the federal government acquired SRS in 1950, much of the land which had once supported the pines and woodpeckers had been cleared for farming, and on the remainder the larger, more valuable trees had been removed. No reliable records exist that indicate the number of red-cockadeds that had inhabited SRS forests when DOE acquired the land; however, employees who have worked there over the past 20 years have reported that 20 to 30 pairs could have been present.

Fully committed to restoring the red-cockaded population at SRS, the department set aside 100,000 acres of forest and developed a habitat management plan. Pines would be left to mature into red-cockaded nesting habitat. Stands would be thinned periodically to allow more room for growth of the large pines. A management team would occasionally burn the hardwood mid-story growing under the pines. Fire is a natural component of southern pine ecosystems. If fire is excluded from the forest, hardwoods develop, rendering the habitat unsuitable for red-cockaded woodpeckers.

These measures are essential, but alone they could not solve the problem. Most of the stands at SRS are only 40 to 50 years old. Decades will have to pass before the trees mature into 85- to 95-year-old nesting habitat. In the meantime, how were we going to protect and increase the critically small woodpecker population so that birds would still be around when habitat conditions improved?

The upshot of our meeting with the DOE was that Peter and I were offered whatever assistance we would need to answer that question. As we left our meeting we were elated. In many ways this was a researcher's dream come true: the chance to test years of theory, knowledge, and ideas by developing and actually using

JULIA SIMS

a management strategy to recover a threatened population. The problems, however, were overwhelming. With only five birds left, we had to take immediate action to prevent them from disappearing. But simply saving these five birds was not our ultimate goal. The SRS population would have to increase to several hundred pairs before we would feel reasonably secure. In addition, we hoped that what we learned at SRS would benefit populations in other parts of the species' range.

To put our problem and eventual solution into perspective, we needed to consider the rangewide status of the red-cockaded woodpecker. It is not a typical endangered species. Many endangered species, such as the California condor and whooping crane, are characterized by small numbers of individuals and a limited range, often in a rare habitat type or a geographically small area. In contrast, red-cockaded woodpeckers are still found from Texas to Virginia and scattered throughout Oklahoma, Arkansas, Kentucky, and Tennessee. Most of them dwell on federally owned land, particularly national forests that harbor stands of mature pines. A recent survey of these lands by the Forest Service and the USFWS found approximately 3,000 breeding pairs. Although this number is relatively large, it is deceptive. In the case of the red-cockaded, the way that individuals are distributed among populations is just as important as the total number of individuals.

Historically, red-cockaded woodpecker populations lived uniformly throughout the South. Mature pine forest extended in broad belts for miles and miles, and the woodpecker was distributed continuously throughout this pine region. Around the turn of the century, agriculture and logging virtually eliminated the mature southern pine forests.

The trees that naturally reseeded or were planted to restore the forest landscape are now harvested every 20 to 50 years; 90 percent of the forest in the South is privately owned, and the economics of timber production strongly influences the fate of the forests. Trees a mere 20 to 30 years old can provide the cellulose fiber for pulp and paper, and even large saw timber can be produced in the favorable southern climes with trees as young as 40. As a result, the mature 85- to 95-year-old trees required by the red-cockaded woodpecker for nesting and roosting cavities have become a very scarce resource.

Much of the remaining mature pine forest grows in widely scattered tracts on public land. From the woodpecker's point of view, each tract is an island haven surrounded by an inhospitable sea of farms, development, or forest too young to be suitable for nesting.

Once we appreciated the significance of the islandlike existence of the red-cockaded, we realized that the seemingly substantial total of 3,000 pairs was not only deceptive, but irrelevant. That number represents not one large population, but about 30 isolated ones, few of which are large enough to be considered secure. Scattered throughout the remaining old-growth trees in the South's federal forests are 19 populations numbering 50 or fewer pairs. Six contain 50 to 200 pairs. Only five populations consist of over 200 breeding pairs. We were troubled by these figures because we knew that small, isolated populations are more susceptible to extinction than larger ones.

C. C. LOCKWOOD

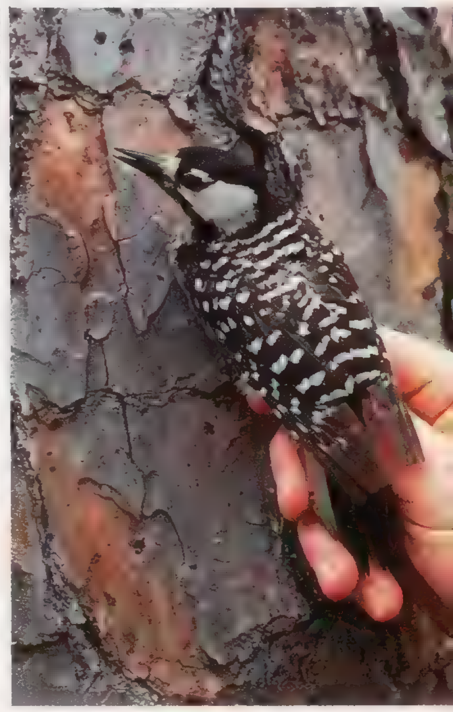
A hundred years ago logging and agriculture virtually wiped out the South's mature pine forests, and the economics of timber production still affect the fate of the forests. Since younger trees, such as those on this plantation, can be harvested for paper and pulp production, the older pines that are important to the birds have become a scarce resource indeed. Still, scientists continue to concoct strategies designed to increase the number of red-cockadeds. A basic ingredient in managing a species is knowledge of its life history. Below, a scientist bands, then releases, an individual in the hopes of learning about its ecology and behavior.

Ecologists studying island faunas have learned much about the biological processes leading to extinction. When once-continuous habitats become fragmented into islandlike areas, two results are inevitable. The fragments can support no more than small populations of animals, and the discontinuity of habitat leaves animal populations on one fragment separated from those on others. The combination of habitat fragmentation and population isolation creates a high risk of extinction.

All populations fluctuate, but the smaller the population, the more likely it will drop to zero. Also, the birds may not be of appropriate sex and age to reproduce. Small populations are more vulnerable to weather, competition with other species, predation or disease, and problems associated with inbreeding as well as other related genetic problems.

Overwhelming as these factors might appear, we became optimistic that our efforts to save the red-cockadeds at SRS could also improve the rangewide status of the bird; we decided that we should consider the Savannah River Site as supporting not simply five individual birds but rather the nucleus of one entire population.

Over the past four years we have discovered that indeed, the SRS red-cockaded population suffers from most of the maladies associated with small, isolated populations. For example, the sex ratio of the birds was unbalanced. Of the five birds only one was a female, which meant there was only one breeding pair. The Savannah River Plant is surrounded by private


TODD ENGSTROM

BHL

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THE BIG LOSER

The red-cockaded woodpecker was listed as an endangered species in 1970. Since then, despite occasional successes such as the one described by Dr. Lennartz, the bird's population throughout most of its range has been falling. At many sites the bird has been completely extirpated. Nearly 20 years of federal supervision have left us with fewer woodpeckers than when they were first listed.

How could such a thing happen? The answer to that question depends very much on whom you ask. The battle over the red-cockaded's fate has brought many economic, ideological, scientific, regional, and personal interests into conflict, each with its own perspective and its own agenda. The outcome has yet to be decided — it is not clear who the winners will be. It seems clear that so far, the woodpecker has been the loser.

Although controversy has surrounded the red-cockaded for decades, the problem the woodpeckers face is a simple one: the birds need lots of big pines in which to nest and forage, and large stands of big pines are being cut down. One of the few places such forests remain is on the lands managed by the U.S. Department of Agriculture's Forest Service. The Forest Service is legally obligated to provide adequate management programs for endangered species. In practice that means the Forest Service must follow a set of guidelines for protecting the woodpecker. These guidelines are based on the species' recovery plan, which is produced under the auspices of the agency that implements the Endangered Species Act — the U.S. Fish and Wildlife Service (USFWS).

Courtesy Cable News Network (5)

The current round of debate began in 1975, when a team was chosen to formulate a recovery plan for the woodpecker. The team was headed by Dr. Jerome Jackson, an ornithologist at Mississippi State University and an expert on the red-cockaded woodpecker. The Forest Service, Dr. Jackson asserts, was trying to protect the red-cockaded before the species was even declared endangered; in fact, the foundation of Jackson's original recovery plan was the chapter in the Forest Service's wildlife habitat management handbook on the red-cockaded.

Efforts to protect the woodpecker, however, received a setback when the recovery team was appointed, Dr. Jackson says. The team, he claims, was disproportionately weighted with representatives of timber interests, which would lose access to federally administered forests if the forests were managed on behalf of the woodpeckers. The result of this bias on the team, he says, was a plan too weak to protect the birds adequately, and, he says, it was weakened further after it was sent out for critical review.

The team's plan was approved by the USFWS in 1979. Dr. Jackson says the team emphasized several approaches. They advocated an extended harvest rotation schedule, which would prevent pines from being cut down by logging companies before they reached the age at which the birds prefer to use them for nesting and foraging habitat. The team also favored considering the species recovered when populations had been stable or increasing for a number of years; they did not provide specific numbers as criteria for determining when the bird was recovered. The team opposed removing the species from the endangered list one population at a time. Another recommendation was that forested "highway" corridors be maintained between populations.

While the plan was being formulated, the results of new research about the species' biology became available, but Dr. Jackson's team was not permitted to revise the plan. The team was disbanded in 1982 by the southeast region of the USFWS.

The Fish and Wildlife Service next asked Dr. Lennartz to revise the recovery plan. Dr. Lennartz, who works for the research branch of the Forest Service, had been studying the red-cockaded woodpecker for eight years. He says that Dr. Jackson's initial work was very valuable, but that his team was replaced because their plan did not include any recovery objectives and offered only one strategy for managing the bird: the extended harvest rotation schedule. Dr. Lennartz says that the revised plan, approved by the USFWS in 1985, emphasizes *multiple* strategies for managing nesting habitat, an assertion with which Dr. Jackson disagrees.

Shortly after the plan was approved, a committee of the American Ornithologists' Union (AOU) published a report in *The Auk* on the status of the bird and the management practices described in the revised recovery plan. The AOU report, written at the request of the International Council for Bird Preservation, said the plan made too many concessions to the timber industry and emphasized the minimal rather than optimal conditions necessary to preserve the species. When an endangered species is at stake, the AOU authors wrote, management plans should err on the side of conservation. Specifically, the authors argued that the plan's recommendation of 125 acres of foraging habitat per clan of birds would support the bird only in superior habitat, and that the plan did not require high enough proportions of the mature pines the birds need. The committee also contended that the recovery objectives—the criteria for when the woodpecker's status could be downgraded to "threatened" and then "recovered" — were inappropriate. Dr. Jackson discussed and reaffirmed the AOU's criticisms of the 1985 plan in the winter 1986 issue of *American Birds*.

Certain other scientists apparently had fewer reservations about the revised recovery plan: in June 1987, Dr. Lennartz and his associates were honored by the Society for Conservation Biology for their efforts to save the red-cockaded. In June 1988, however, a letter by Dr. Blair Csuti published in the Society's journal, *Conservation Biology*, noted that Dr. Lennartz's plan had been criticized by the AOU committee, repeated the AOU's criticisms, and stated that "this controversial recovery effort would benefit from an objective application of the principles of conservation biology."

In his response, also published in *Conservation Biology*, Dr. Lennartz addressed some of the AOU criticisms. He contended that his revised plan had been misrepresented and misinterpreted, arguing that the plan's recommendations were grounded in sound scientific research and that the "focus on minima" existed not in the plan but in the minds of the critics. He asserted bluntly that "economics and timber harvesting were not considered in establishing the recovery goal," and that "the recovery plan makes no concessions to timber harvesting and the timber industry." Dr. Lennartz also contends that some critics confuse the recovery plan itself with the implementation of the plan by the Forest Service.

The ultimate test of a recovery plan, of course, is whether the species it is designed to protect actually recovers. How has the woodpecker fared since 1985? There have been a few positive signs. In addition to the birds at the Savannah River project, two larger populations have remained stable and one has increased, according to Dr. Lennartz. Dr. Jackson, however, says it is premature to conclude that even these populations are safe, and that the birds in these larger populations have been nesting and foraging in trees that have not been subjected to the approach the Forest Service has permitted elsewhere. This approach involves clear-cutting or even-aged management — cutting virtually all the trees in certain areas rather than choosing some for harvest and allowing others to survive.

With these few exceptions, however, the woodpeckers are unquestionably doing poorly. According to a 1978 study by Dr. Jackson, roughly 84 percent of all surviving woodpeckers live on federally administered lands. In the national forests, recent research shows population declines, some of them dramatic, in at least two-thirds of the populations, most of which were already small.

Do these declines mean the recovery plan has been ineffective? That depends on your interpretation. A recovery plan is only as good as its implementation, and observers agree that at many woodpecker sites (but not all), the Forest Service has implemented its own management guidelines poorly. This was reflected in a 1988 Texas District Court ruling in a case brought by the Sierra Club and other environmental organizations. The judge ruled that the Forest Service had violated the Endangered Species Act, failing to implement its guidelines and thereby failing to protect the woodpecker's habitat. The judge ordered the Forest Service to give up its exclusive use of clear-cutting in the national forests in Texas. According to Dr. Lennartz, the judge did not fault the recovery plan, and the effectiveness of the plan cannot be judged where its requirements were not followed. Dr. Jackson says that red-cockaded declines resulted from poor implementation of a recovery plan that was weak to begin with.

The Forest Service's implementation problems had several causes. In some national forests, funding was lacking; in others, the requisite knowledge was lacking. At some locations, as in the Texas forests, the Forest Service simply made serious mistakes.

An endangered species makes the news. A feature on Cable News Network focuses on the conflict between environmental and economic interests.

Facing additional lawsuits by environmental groups and new evidence of shrinking populations, the Forest Service has concluded that its internal red-cockaded management guidelines need revision. For the time being, a moratorium is in effect on clear-cutting within three-quarters of a mile of any colony that is part of a population containing fewer than 250 active colonies; this moratorium will affect birds at 20 of the 23 existing populations. An interim plan was to have been completed by September 1989. For the next one and a half to three years, the Forest Service will reanalyze the status and needs of the red-cockaded woodpecker. The result will be a new Environmental Impact Statement, which will be used as the basis for revising the Forest Service guidelines for managing the birds.

By the time the guidelines are revised, the bird's numbers will have been declining for more than two decades. Has the contentiousness of the debate hurt the woodpecker? It's difficult to say — both sides believe they have consistently acted in the bird's best interest. On the other hand, a united front against the destruction of habitat could only have helped — endangered species face grave enough problems without dissension among their defenders.

One thing is clear: we must hope that the new guidelines are correct, and that their implementation succeeds. They may represent the last chance for the red-cockaded woodpecker. — ***D. R. Otis*** lands. Some of the old plantations have retained stands of mature pine that harbor a few woodpeckers, but not enough, nor are the stands close enough to SRS, for us to assume that mates for the bachelor males might emigrate. We had planned to move some birds from another population to lessen the possibility of inbreeding, but now the immediate need was simply to find mates. The first year we brought in yearling females from the Francis Marion National Forest (FMNF) on the South Carolina coast 120 miles away. FMNF supports one of the largest populations of red-cockadeds. We chose yearling females because they almost always leave their parents' territory, and our hope was that since the birds were dispersing anyway they would remain at the release site. They stayed! And in short order our breeding "population" had jumped from one to three pairs.

MICHAEL LENNARTZ

WILSON BAKER

Drippy white sap far up this tall timber is a sign that a red-cockaded has pecked out a nest hole. A researcher gingerly climbs to inspect the cavity which might house the birds' hole-stealing competitor, the flying squirrel.

We were again elated, but the celebration was cut short by a second problem. Everyone who studies red-cockaded woodpeckers is acquainted with flying squirrels. They, too, nest in cavities and frequently take over those of red-cockaded woodpeckers. They have also been observed preying on red-cockaded nestlings and eggs. Flying squirrels are an everyday part of the woodpecker's life, and with large populations a certain amount of cavity competition and nest predation is normal.

But with very small populations, ordinary events have extraordinary consequences. A loss of one nest among hundreds is inconsequential; a loss of one in three is catastrophic. We had anticipated some problems with flying squirrels, and prior to moving the new females to SRS we nailed wood plates over cavity entrances to keep out squirrels until the red-cockadeds were ready for the cavities. The first morning the females were released we unsealed all the cavities, and by 4:00 P.M. one was occupied by a flying squirrel. Over the next 10 days 30 flying squirrels moved into three woodpecker sites, and all three females had been pushed out of their tree cavities. The only way we knew to protect the birds was to climb up the cavity trees and remove the flying squirrels.

We've done this periodically over the past three years, and each year new offspring are added to the SRS woodpecker population. The three original nest sites have had a pair of woodpeckers each year, and in 1989 young from two of the original groups mated, giving us 18 individuals, including four mated pairs. We are crossing our fingers and hoping that we can keep the numbers inching up.

Once we had dealt with the squirrels, and the woodpeckers began reproducing, we watched for signs of inbreeding in the new generations. With so few individuals in a population, we presumed that a certain amount of inbreeding would occur and that its effects were likely to be felt. Because SRS supports only a handful of birds, after several generations the red-cockadeds would all be related simply because there would be no unrelated birds to choose as mates. Just like people, birds suffer when closely related individuals mate and reproduce. In its severest form, inbreeding can result in birth defects, lower tolerance to disease, and impaired reproductive performance. At SRS we found no clear evidence of inbreeding, but we did find indications that genetic variability — a measure of the bird's ability to adapt to its environment — was beginning to deteriorate. Peter has found a lack of variability associated with minor physical deformities in other small populations. These findings reinforced our conclusion that the addition of new, unrelated birds to the plant site was a top priority.

Our experience at SRS indicates that the most immediate problems to solve are having birds of appropriate sex and age to breed, keeping cavities free of competitors so the birds have a nest site, and protecting the nests from predators and competitors. However, moving birds from one population to another to provide breeding adults will also provide for gene flow among populations, and we hope serious genetic problems can be avoided.

Hope is the wellspring of energy for biologists working with endangered species. It dampens the emotional swings between frustrating problems and encouraging successes. This past spring, encouraged by the success at SRS, we went to Georgia to help the ranger on the Oconee National Forest start restoring a population of red-cockadeds on the north end of his forest.

The scene was familiar — a single group of cavity trees, a solitary male woodpecker roosting outside rather than in one of the cavities. We climbed six cavity trees and found four flying squirrels, a red-bellied woodpecker, and a black rat snake. After removing the interlopers, we brought in a yearling female red-cockaded from one of our study sites, and within three weeks we were celebrating a clutch of three eggs.

We should have known better. Two weeks later, about the time the eggs should have been hatching, they were gone and a flying squirrel had taken up residence in the nest cavity. Rather than becoming too discouraged, we are looking forward to next year's nesting season. At SRS we learned the valuable lesson of maintaining two intangible resources — hope and perseverance. □

FEEDER FRENZY

Richard E. Bonney, Jr., and Kirstie Forbes-Robertson

Choosing a bird feeder can be a bewildering experience. Most stores carry several types, including tubes — long cylinders that dispense seed through small holes in the sides; domes — seed-filled bowls suspended below domed roofs; bubbles — round feeders that look like flying saucers; and wooden hoppers, which usually look like small houses with clear plastic sides. To add to the confusion, all these feeder types are made in a variety of sizes and shapes by a multitude of competing manufacturers. This leads to an obvious question — one that we're often asked here at the Lab — which feeder is best?

There is no definitive answer. Almost any feeder will attract birds as long as you place it in a location that birds feel comfortable visiting, and fill it with seeds they're inclined to eat. Also, most people who feed birds have personal preferences in feeder design. Some like them big, others small; some like plastic, others wood; some like simple designs, others prefer feeders that look like spaceships.

Nevertheless, some feeders do work better than others because of the way they're designed. In a bold attempt to determine objectively which models work best, we solicited samples from major manufacturers, gathered the feeders on a big table, convened a panel of Lab staffers, and evaluated the feeders on several pertinent characteristics. Finally, we prepared a chart rating the feeders.

Criteria. Our panel comprised the two of us and Steve Sibley, Debbie Wood, and Scott Sutcliffe. All of us have fed birds for many years, using many of the feeders under consideration, and among us we decided on the following criteria for evaluation.

Instructions for use — are they included? If so, are they clear and accurate? Do they discuss feeder placement, use, care, and maintenance?

Assembly — does the feeder require assembly? Is it difficult?

Attachment — how easily does the feeder hang or mount? Are mounting devices strong enough to hold the feeder when it's full?

Design — is the cover secure yet easy to remove? Is the feeder simple to fill? Will feeding birds be in clear view?

Seed retention — does the feeder hold its seed? (We simulated a wind storm to find out.)

Durability — how sturdy is the construction material? Are seed ports reinforced? Are perches and other attachments strong and secure? Is the feeder fastened together well?

Water resistance — does the feeder keep seed dry? (We simulated a driving rain to answer this.)

Maintenance — Can the feeder be cleaned easily?

Feeders have other notable characteristics that are difficult to rate objectively but merited inclusion on our chart: price, capacity, type of mounting, number of perches, length of guarantee, whether seed trays are built-in or offered as an option, and whether the feeder incorporates a squirrel-obstructing device. We figure that the importance of these characteristics is a matter of personal preference, and it's up to the buyer to determine which feeders offer the best value.

A few observations, though: pole-mounted feeders are generally easiest to use since they can be placed anywhere you can drive a pole in the ground; seed trays on tube feeders help to prevent seed from spilling on the ground, but often make the feeder accessible to large birds that may be unwanted; and universal baffles and cones are available that will make nearly any feeder relatively squirrelproof.

Results. The table on the next page rates 28 feeders, those that the manufacturers consider to be either their best or most representative of their product lines. We rated all the feeders that were sent to us except for a handful of "gizmos" — models with springs for perches, or counterweighted perches, or adjustable ports. We don't have enough field experience with these feeders to know whether they really work.

We hesitate to make many recommendations since needs and preferences vary with individuals. We will say that you can't go wrong with the Droll Yankee Big Top. This large-capacity dome feeder is easy to fill, easy to clean, and virtually squirrelproof and indestructible. Our tube feeder of choice is the Aspects Twin Tube, which can accommodate two types of seed at once and beats Droll Yankee's basic tube feeder (model A-6) by requiring no assembly and being a bit easier to clean. The Audubon Workshop Super Ball is the top-rated bubble type feeder. And a decent economical feeder is the Hyde's Round Seed Silo No. 112 — beware of the assembly, though, if you're fumble-fingered.

You should be able to find a feeder in this table that will suit your needs. ☐

In a bold attempt to crack the baffling feeder question, the Laboratory of Ornithology convenes a panel of knowledgeable staffers to test and rate 28 competing models.

Rick Bonney is senior editor of *The Living Bird Quarterly*. Kirstie Forbes-Robertson is manager of the Crow's Nest Birding Shop.

Brand and Model	Type	Overall Rating	Suggested Retail Price	Capacity (quarts)	Mounting	Number of Perches	Seed Tray	Squirrel Guard	Guarantee (years)	Instructions	Assembly	Attachment	Design	Seed Retention	Durability	Water Resistance	Maintenance	Advantages	Disadvantages
Droll Yankee Big Top–Model BT	D	5	$44	3.5	H	NA	N	BF	3	5	4	5	5	5	5	5	5	1, 2, 3	
Droll Yankee Seed Saver–Model X-1	D	5	17	.75	H, P*	NA	N	BF	3	5	4	5	5	5	5	4	5	1, 2, 3	1
Aspects Twin Tube 038[1]	T	5	28	1.5	H, P	4	O	N	1	5	4	5	5	5	5	4	4	4	
The Mandarin	D	4	48	4.0	H	4	N	BF	N	5	4	4	3	5	5	4	5	1, 3	3
Audubon Workshop Super Ball	B	4	20	3.0	H	4	N	N	N	1	5	5	5	5	5	5	4		5
Droll Yankee Basic Tube Feeder–Model A-6[2]	T	4	22	1.0	H, P	6	O	N	3	5	3	5	5	5	5	4	3		2
Hyde's Super Silo No. 114	T	4	40	3.0	H, P	9	O	N	N	3	5	4	5	5	5	5	2	4	3, 4
Duncraft Satellite	B	3	10	.25	H	1	N	N	1	3	5	4	3	5	5	5	3		1, 2, 5
Hyde's Squirrel's Dilemma No. 104	T	3	27	2.75	H, P	12	N	W	N	3	5	4	4	5	5	4	1		4
Duncraft Cling-a-wing	B	3	10	1.0	H	4	N	N	1	3	4	5	4	3	5	3	4		3, 5, 6
K-UF Ultimate Feeder	T	2	55	4.5	H	9	Y	BF	N	1	5	5	3	5	5	4	2	4	3, 4, 7
Hyde's Round Seed Silo No. 112	T	2	15	1.0	H, P	4	O	N	N	3	2	4	4	5	4	4	4		
Aspects Chickadee Feeder 010	T	2	21	.75	H	NA	N	N	1	1	5	5	3	5	3	3	5	3	1
Audubon Workshop Yankee Mariner	WH	2	40	5.0	H	NA	NA	N	N	1	5	4	4	5	5	2	3		4
Aspects Small Cedar Feeder 011[3]	WH	2	36	2.5	H, P	NA	NA	N	1	1	5	5	2	5	5	2	4		2, 5
Hyde's Dome Feeder DO-83	D	2	22	.75	H	NA	Y	BF	N	3	2	4	3	5	4	3	4	3	1, 3
Hyde's Hanging Barn Feeder #121	WH	2	26	5.0	H	NA	NA	N	N	1	5	3	3	5	4	3	3		9
Audubon Feeder–Pole Mount	T	1	45	4.0	P	4	N	C	N	2	1	4	2	5	2	5	3		2
Duncraft Hanging Cardinal Barn	WH	1	35	3.0	H	NA	NA	N	N	1	5	3	2	4	5	1	3		5, 9
Noel's Squirrel-less Feeder No. 301	T	1	19	1.25	H	12	N	W	3	3	4	1	2	5	3	1	5		
Hyde's Junior Seed Silo No. 110	T	1	10	1.5	H	6	O	N	N	3	2	1	4	5	2	4	2	4	2, 3, 8
Hyde's Bird Filling Station BH-52	WH	1	17	2.5	H	NA	NA	N	N	1	5	2	2	5	4	2	1		4
Audubon Feeder–Hanging	T	1	50	8.0	H	4	N	C	N	2	1	3	1	5	1	5	2		2
Window Feeders																			
Aspects Buffet 002	W	3	15	.5	S	NA	NA	NA	1	5	4	3	4	3	5	1	5	5	10
Duncraft Cardinal Classic Windowpane	W	2	20	.75	S	NA	NA	NA	1	4	5	4	3	4	5	1	4		
Hyde's Window-Vu WV-84	W	2	14	1.5	S	6	NA	NA	N	3	2	3	4	5	2	4	2	4	
Droll Yankee The Winner	W	1	24	.5	S†	NA	NA	NA	3	2	1	5	3	4	5	1	4		
Meta Feeder	W	1	80	3.0	S	NA	NA	NA	L	4	4	1	3	5	4	1	2		

Dome

Bubble

Tube

Wooden hopper

Window

Type
B–bubble
D–dome
T–tube
W–window
WH–wooden hopper

Overall Rating
5–excellent
4–very good
3–good
2–fair
1–poor

Mounting
H–hanging
P–pole mount
S–suction cups
S†–screw mount optional
*–adapter required

Squirrel Guard
BF–baffle
C–collar
W–wire casing

Miscellaneous
N–no
Y–yes
O–optional
NA–not applicable
L–lifetime

Advantages
1. Virtually squirrelproof
2. Very easy to fill
3. Very easy to clean
4. Separate seed compartments
5. Seed trays remove for easy cleaning

Disadvantages
1. Small capacity
2. Must be disassembled for thorough cleaning
3. Cover attachment awkward
4. Difficult to clean
5. Difficult to fill
6. Seed blows out in wind
7. One tube dispenses thistle seed only
8. Top not secure
9. Made of redwood (an ecological no-no)
10. Seed trays may blow away or be removed by squirrels

[1] Similar models with different capacities: Songbird (1 qt.—$24), Gemini (2.5 qts.—$33)
[2] Similar but larger models: A6-XL ($29), B-7 ($41), B-72 ($69)
[3] Also available as Large Cedar Feeder (5 qts., $44)

Brackets indicate models having equal total scores when eight rating categories are tallied.

JOE McDONALD

Employing both high and low technology, Williams tracks the travels of Pacific-routed migrants. This wandering tattler makes a pit stop along the California coast. All but the largest shorebirds occasionally rest while migrating.

ON THE ROUTE PACIFIC

Janet M. Williams

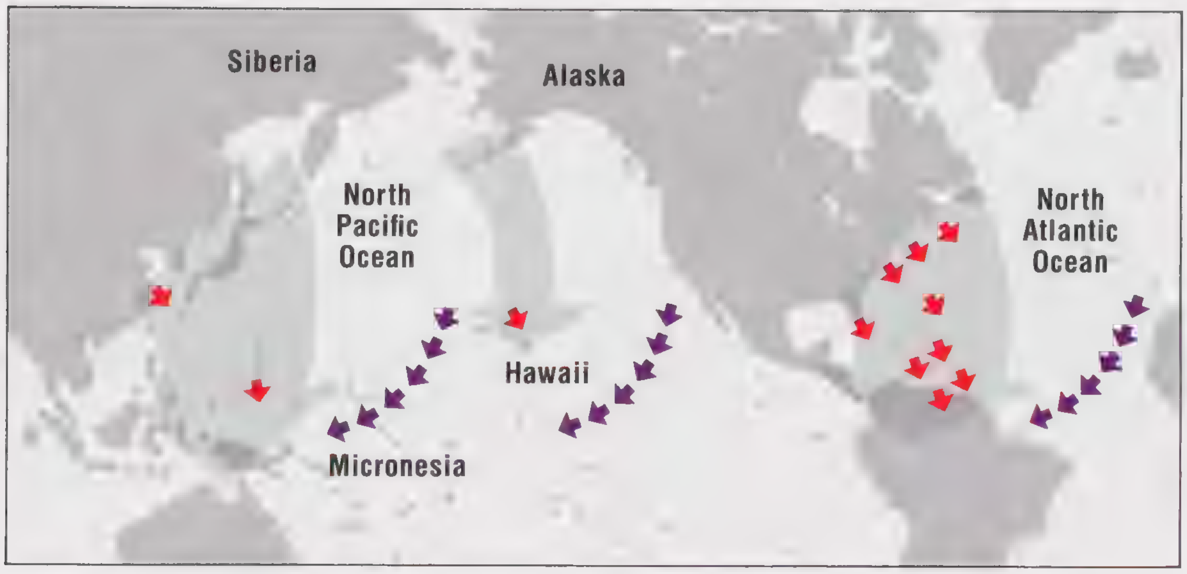
Over and over I kept asking myself: What am I doing in this boat? We were caught in a tropical storm, looking up at waves that alternately towered over us and broke into the boat, with winds so strong that the rain drove horizontally into our faces like pellets of hail. We were in a 13-foot fiberglass boat with only a small outboard motor, no compass, no oars, no life jackets, and only one tank of gas. We had just enough food and water for one meal for the six of us: my husband Timothy and myself, our two teenage sons, Robert and Peter, who always accompany us on our research travels, our niece and research assistant, Tricia Grout, and our boatman. For all I knew, we could have been in the middle of the Pacific Ocean instead of half an hour out of port; the squall had come up so fast and it was raining so hard that we could only see a few feet ahead. I kept telling myself to try to relax — these Micronesian fishermen have been traveling these waters for centuries and know exactly where they are at all times.

I had noticed our boatman check his direction with regard to both the wind and the waves as we pulled into open water. But at either the top or the bottom of one of the stormy waves and with zero visibility, I began to realize the danger of our situation; the next island downwind of us was about 2,000 miles away. Only a year before, three fishermen here in the Federated States of Micronesia had been lost at sea in just this sort of boat during just this sort of storm. Out loud I said "If we ever reach this island I'm not going back until the storm is over, even if I have to build a shack and spend the night!"

What was I doing in that boat? Rationally, I knew; we were on our way to Ant Atoll off the coast of the island of Pohnpei out in the western Pacific to survey migrant birds that breed in the Arctic and fly south to winter in different parts of the world, including the most remote islands and atolls. Emotionally, I was not at all sure I wanted to be in the boat just then, or in any boat ever again. What's more, Tim and I were responsible for the lives of the three young people we had brought with us. I wondered if we should turn back, but that wouldn't work — we couldn't see the island we had left any better than the atoll ahead of us.

After what seemed like many hours, but was probably less than one, the storm started to clear, revealing spectacularly dramatic lighting on the craggy bluffs of Pohnpei behind us.

As the storm abated, I was able to bring back into perspective the purpose of our trip: the survey of shorebirds that have migrated thousands of miles over open water to distant oceanic islands. Would we find any migrant birds on Ant Atoll? What causes migrants to fly to remote oceanic islands? Do different species of birds migrate to different places? How do they find their way? These were the sorts of questions that interested Timothy and me, and the reason for our being in the boat heading for a remote atoll. The questions brought to mind all the miles we had covered over the years in search of migrant birds, and the travels that had taken us to Bermuda, Trinidad, the Galápagos, Alaska, Hawaii, Guam, Fiji, New Zealand, and Australia.



Above, radar has shown that the birds do not necessarily migrate in narrow flyways; rather, they travel in broad fronts (gray arrows), widely dispersed over land and ocean. Purple arrows represent northeast trade winds that push the birds southwest. Red arrows, the locations of radar sites, indicate the direction the birds are flying. Below, the van on Homer Spit, Alaska. It departed Swarthmore, Pennsylvania, and crossed North America carrying the Williamses, the mobile radar unit, two tents, four students, 10 weeks' worth of supplies, and a mother-in-law.

For over 20 years, Tim and I have observed birds migrating over the oceans of the world. We have used radar, photographing the radar screens to determine the timing, direction, speed, and density of migration. We have also made detailed counts of migrant birds on the ground near the radar sites to help establish which species are migrating, since it is not possible to identify the species of bird on radar. Various other research techniques have been used in the study of bird migration, including banding, following the signals of radio transmitters attached to birds, and counting birds as they cross the face of the full moon or pass through a light beam pointed up into the night sky. We chose radar because it works both night and day and follows birds at distances up to 50 miles.

In our research in the Atlantic Ocean in the late 1960s and early 1970s, we used a total of nine radars from as far north as Halifax, Nova Scotia, south to Tobago in the Caribbean, including one on a Woods Hole Oceanographic ship southeast of Bermuda. We found that many land birds, including passerines and shorebirds, take an overwater route on their migrations to the Caribbean and South America. From August through November, migrant birds such as lesser golden-plovers, Hudsonian godwits, and blackpoll warblers leave the east coast of North America from Nova Scotia south through North Carolina and head southeast on the strong north or northwest winds that follow the passage of a cold front. After passing Bermuda, the birds pick up the strong easterly trade winds southeast of the island that, in effect, blow them to their destinations.

Tracking the migrating birds on radar revealed that they maintained their southeasterly heading regardless of wind or weather. The majority of these migrants fly over the islands without stopping. The birds that use this overwater route avoid land predators and shorten their migration by hundreds of miles.

In the late 1970s and 1980s, we extended our work to the Pacific Ocean. Looking at the globe, we could see a geographic similarity between the eastern coasts of North and South America and the eastern coasts of Asia, the Philippines, Papua New Guinea, and Australia. The shapes of the two sets of eastern coasts are roughly the same. We predicted that migration patterns over the western Pacific would resemble those over the western Atlantic, with birds leaving coastal areas after a cold front on a northwest wind and heading southeast. We also wanted to determine what land birds were migrating over the Pacific (where the distances are greater than in the Atlantic), in which direction the birds were heading, and whether or not they were aided by winds, as birds are in the Atlantic.

Much of the migration over the Pacific begins during the summer months in Alaska and eastern Siberia. Numerous bird species breed in the arctic tundra, where there are vast regions for nesting and a seemingly unlimited supply of insects on which to raise the hatchlings. In winter, though, these birds cannot endure the severe and inhospitable tundra so they must travel to the south. To observe their departure, we drove our van, with a mobile radar mounted on top, from our home base of Swarthmore College in Pennsylvania across North America to Alaska. En route we picked up four Swarthmore students and my mother-in-law, giving us a total of nine people, two tents, one radar, and 10 weeks' supplies all in one van!

We were particularly interested in the shorebirds, which make up the majority of the birds that migrate to the islands of the central, western, and southern Pacific. Many shorebird species breed in northern

TIMOTHY WILLIAMS (2)

Alaska in late May and early June. After feeding the young birds for about four weeks, the adults leave the nest sites and fly to the vast mudflats and beaches along the coast of southern Alaska. There the birds congregate in large flocks and feed on the rich fauna to prepare for the long flight over the Pacific. Among the shorebirds, only the phalarope can swim on or feed from the open ocean; all the others must acquire enough fat, nearly doubling their weight, to ensure their arrival at an island that may be as far as 4,000 miles away.

The young birds remain at the nesting sites, continuing to feed for another two to four weeks after the adults have left. Then they, too, fly to the coastal feeding sites. By the time the juvenile birds have arrived, however, most of the adults have begun their migrations. Thus, even in their first year, the young are on their own as they feed and venture out over the open ocean in search of southern islands and wintering roosts.

While in Alaska we used the Federal Aviation Administration (FAA) radar at the Anchorage airport, which is good for tracking birds to about a 30-mile range, to make daily observations of migrating birds during the beginning of their southward flights. We also wanted to position our van, with its mobile radar, at sites along the southern coast of Alaska near the shorebird feeding areas in hopes of observing the initial stages of migration. Although our little radar follows bird targets only up to one mile away, it is helpful for short-range observations — especially at night, when it is impossible to see birds with binoculars or a telescope.

An advantage of our mobile radar is that it can be located anywhere the van can go. We were restricted, however, to places we could drive the van, so we chose the southern tip of the Kenai Peninsula, near Homer, and Hartney Bay, just outside the fishing village of Cordova. Homer is frequented by tourists, but Cordova is reached only by ferry, and our arrival caused quite a sensation; virtually no tourists visited Cordova at that time, certainly not in a large van with a radar mounted on top. Within 10 minutes of our arrival we were talking to the police, who were "just curious as to what we might be doing." Apparently we had been reported as suspicious-looking characters who might be coming to town to sell something.

In addition to using the mobile radar along the Alaskan coast, we made daily counts of shorebirds feeding on the mudflats and beaches to learn which species were about to make the southward migrations. By early August the coastal regions of southern Alaska were filled with feeding shorebirds, soon to depart, and our radar screens were filled with migrating birds.

Following the shorebirds southward on their migration we went to Hawaii, in the central Pacific, about 2,500 miles south of the Aleutian Islands and about the same distance from the west coast of the United States. We were curious to find out whether southbound migrants would fly over the Hawaiian Islands, as they had flown over Bermuda in our Atlantic study, or whether the birds would stop on the islands to rest and feed before continuing southward. We also wondered which species would make the long overwater flights. From mid-August through October, all the birds echoes we saw with the FAA radars on Oahu and Maui appeared to be of birds either landing or taking off from the islands. We did not see any migrants flying over the islands without stopping. We concluded that the distance of 2,500 miles between the Aleutian Islands and the Hawaiian Islands must be the upper limit for all but the largest species of shorebirds, and that the birds were landing to feed and rest before going farther to some other distant island, or to stay on the island for the winter.

Becky Shahan, a Swarthmore student (left), and Williams observe migrating shorebirds at Hartney Bay, Alaska. Besides tracking with radar, the team made daily counts to learn which species were about to start the southward migration.

As in southern Alaska, migrant shorebirds in Hawaii find feeding areas on the beaches and coastal mudflats and along the shallow, open edges of ponds. We also found many migrants in the sugarcane settling ponds at Waipio Peninsula on Oahu and at the sewage treatment plants of both Oahu and Maui. Although humans might not like these hot, smelly spots, the shorebirds found rich food resources in such places. The migrant species we saw most commonly in the Hawaiian Islands, in decreasing order, were lesser golden-plover, ruddy turnstone, wandering tattler, and sanderling.

Many shorebirds that migrate to the Hawaiian Islands remain for the winter. We know from the work of Oscar Johnson, an ornithologist at the University of Minnesota who has banded lesser golden-plovers on Oahu, that many plovers overwinter on Oahu and come back not only to the same island year after year, but also to the same grassy spot, such as along a golf course, along airport runways, or on open mountain slopes. The birds defend these winter territories against other members of their own species. Johnson's study shows that it is not by chance that these shorebirds find the Hawaiian Islands as they fly over the Pacific; rather, they return knowingly to the same island and defend the same territory. Johnson has seen several of the same plovers return to the same territories on Oahu for 10 years.

In addition to shorebirds, ducks come from Alaska

1555 woodcut illustrating swallows hibernating with fish, a migration theory even radar couldn't prove.

MIGRATION—TO THE MOON, BY THE STARS

Long before we had mobile radar units and other complex scientific technology—before we had even grasped the basic principle of science, that a good way to understand the world is to observe it carefully and to systematically test our assumptions—humans speculated about the seasonal movements of birds. It seems likely that many prehistoric humans had some notion of migration—after all, the geese showed up year after year in spring and fall and then moved on. Certainly by the time of the classical civilizations a few observers believed that birds migrated. In the 12th century B.C., Homer compared the advancing Trojan army to "the cranes which flee from the coming winter and sudden rain and fly with clamor toward the streams of the ocean," and eight centuries later, Aristotle noted that some creatures migrate from cold lands to avoid winter and flee warm lands in summer to escape the heat.

Aristotle's list of birds that migrate emphasizes hefty birds and expert fliers—pelicans, turtle-doves, swallows, quail, pigeons, swans, and geese. Certain other birds, he wrote, had different options. A few take the simple expedient of changing into a different species. Redstarts, common summer birds in Greece, turn into robins, which occur there in winter. Garden warblers become blackcaps.

To account for the seasonal absence of birds that seemed too feeble to fly vast distances, Aristotle and many subsequent writers proposed that small birds board big, strong birds for the trip, much as people board planes for Florida. Just as some people have a favorite airline, some little birds have favorite big birds. Corn crakes prefer cranes, the goldcrest takes the long-eared owl, and a certain small grebe flies sandhill or whooping cranes. Local peoples used to contend that the small birds that pile up on the northern shore of the Mediterranean on their way south were waiting to hitch rides with storks or cranes. As recently as 1936, a report from British Columbia told of a hunter's shooting a Canada goose carrying a hummingbird nestled in its soft, warm down. Claims of hitchhiking, however, have never been substantiated.

Rather more farfetched was the theory proposed in a tract published in 1703, that birds leaving England flew, not to the Mediterranean or Africa, but to a more distant destination—the moon. The tract's author chose not to give his name, referring to himself only as a "Person of Learning & Piety."

The trip was supposed to take two months. In the best scientific tradition, the Person addressed possible criticisms of his theory. Viz.: The moon continually circles the heavens—how would the bird navigate toward a moving body? Response: the bird waits for a full moon, takes careful aim, and starts flying in a straight line. The moon revolves merrily away, but our steadfast bird continues without wavering. In one month, and again in two, the full moon is at precisely its original location—just as the bird arrives.

How does the bird manage without eating and sleeping?

"As to eating, it may possibly exist without it in that temper of the ether where it passeth, which may not be apt to prey upon its spirits as our lower nitrous air"; furthermore, "Some of those birds are very Succulent and Sanguine, and so may have their Provisions laid up in their very Bodies for the voyage." As for sleeping, the author contends that in space, "where they have no objects to divert them," birds will be so bored that they can sleep as they fly. To keep the sleeping birds from flying smack into the moon and breaking their necks, the author suggests that "some change of air" may awaken them.

Far less implausible, and more durable, was the notion that certain birds hibernate, either in mud at lake bottoms or in caves, belfries, and other dry, quiet places. Unlike the "fly-to-the-moon" hypothesis, the hibernation approach attracted the support of many eminent naturalists, including Linnaeus, Buffon, Cuvier, and Gilbert White. Until well into the 19th century, serious scientific literature was full of hibernation stories, most dealing with members of the swallow family.

The hibernation-in-mud theory may have evolved from the swallows' fall congregations along lake shores. Several observers assert that they saw swallows entering the water by gathering on a reed until they submerged themselves by their collective weight. Olaus Magnus, archbishop of Uppsala, Sweden, observed that along with fish, northern fishermen caught an abundance of swallows in conglomerate masses, gathered "bill to bill, wing to wing, and foot to foot."

As early as the late 16th century, some observers had begun to perform simple experiments in attempts to verify hibernation stories. A French ornithologist exposed caged migrants to winter conditions, but did not induce them to hibernate. John Hunter, an 18th century anatomist, apparently submerged a bunch of swallows to see if they could live underwater (they couldn't) and, one October, put some swallows in a greenhouse with a tub full of reeds growing in water to see if they would creep into the mud and fall asleep (they didn't). By the 19th century, learned societies had received numerous reports of exhausted birds clinging to the rigging of ships in midocean, confirming that they were capable of traveling immense distances, as migration theory suggested. The winter homes of many birds that summered in the north had also been discovered. At the turn of the century, reputable ornithologists generally agreed that stories of bird hibernation were without foundation.

Then, on December 29, 1946, Dr. Edmund Jaeger was walking up a narrow canyon in the Chuckawalla Mountains of California with two of his Riverside College students. To his surprise, he saw a poorwill, a small night bird resembling a whip-poor-will, head upward in a little hollow in the rock. After watching it quietly for ten minutes, he picked it up. It felt cold and seemed unusually light in weight. They tried to revive the bird, even by shouting at it. The poorwill remained completely lethargic, merely blinking one eye before being returned to the hollow.

Ten days later, Jaeger returned and found the bird again. "But this time," he reports, "instead of remaining perfectly quiet, it gave several 'puffy' sounds as if expelling air from its lungs, opened an eye, and began to make a variety of queer high-pitched whining or squeaky mouse-like sounds. After some moments it opened its mouth widely as if yawning and then resumed its quiet."

The poorwill was observed in its hollow over three winters before it disappeared. It entered its torpid state in late November and resumed normal activity in late February. The bird's temperature was found to be about 66 degrees Fahrenheit, 40 degrees lower than normal. A variety of tests indicated that the bird was completely oblivious to its environment. It was the first documented case of hibernation among birds.

Later, poorwills and the related trilling nighthawk were induced to hibernate in captivity. Torpid swifts, hummingbirds, and chickadees have also been discovered, but whether these or other birds can enter a true state of hibernation is not known.

For at least two species, then, research ultimately confirmed the beliefs of folk tradition. Research has also dispelled many migration myths, but this has not left a void where we once possessed a rich variety of appealing but unsubstantiated beliefs. Migration studies have revealed some unexpected facts — that birds can navigate by the stars at night and by tracking the sun's position during the day, can perhaps sense the Earth's magnetic field, and can year after year fly thousands of miles over empty ocean to small, isolated islands. The reality of migration has proven to be as interesting, and as improbable, as the speculations and imaginings of earlier periods. —*D. R. Otis*

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to the Hawaiian Islands each year, primarily northern shoveler and northern pintail. The majority arrive in October, later than most shorebirds. Weather data that we collected from the northern Pacific indicated that the ducks left Alaska during periods of clear skies and strong tailwinds and arrived in the Hawaiian Islands three to four days later. These weather conditions were similar to those in which the shorebirds arrived, and also similar to the conditions in which the birds in the Atlantic were migrating.

To further investigate our prediction that patterns of bird migration over the Pacific Ocean were similar to those in the Atlantic, we continued our research on the island of Guam. Guam's location in the Marianas Islands in the western Pacific, about 2,000 miles off the Asian coast, made it comparable to the location of Bermuda in the western Atlantic. On Guam we could find out whether the migrant birds were flying past the island en route to some point farther south, as had been the case in Bermuda and Antigua in the Atlantic, or whether they were landing on the island for food and rest as they had in Hawaii.

Once again the FAA was extremely generous and allowed us to observe and photograph their radar screens; the radar was located in an installation on Andersen Air Force Base on the northern end of the 30-mile-long island of Guam. Our study lasted 10 weeks from mid-August to the end of October, and our data from the radar showed that most of the birds were flying over the island. Indeed we found that fall bird migration over the western Pacific was comparable to that over the western Atlantic.

In the Atlantic, most migrants fly over Bermuda on their way south, but some birds, in need of food or rest, land on the island during each migration season. We expected to find the same situation on Guam. As my main site for making visual observations of migrants, I chose a mudflat called Dungcas Beach on the west coast of the island. The mudflat was rimmed by an offshore reef which protected the area from large waves. From the shore side it was fed by a large sewer, which considerably decreased the charm of the place, but surely increased the microorganisms and enhanced the food supply for the birds. The mudflat was hot, still, and stinking, but popular among fishermen, and also with dogs, which liked to chase each other through the mud. One morning at 7:00 A.M. there were eight dogs running through the feeding site, chasing away the birds as they went. The heavy clouds of the rainy season often caused downpours and dispersed the feeding birds, and high waters caused by tropical storms occasionally flooded the feeding site.

In spite of all this, it was always exciting to look for new and different species among the migrants. Every day we hoped we would be able to count all the birds, look for new species, and get pictures before the dogs, the rain, or the fishermen interfered. As we found on several Pacific Islands, the shorebirds we saw most often on Guam were lesser golden-plover and ruddy turnstone, followed by gray-tailed tattler, whimbrel, and Mongolian plover.

In addition to our daily counts on the mudflats, we made visual observations of shorebirds at Andersen Air Force Base, near where the radar was located. There we saw numerous lesser golden-plovers on the lawns and grassy areas along the runways. We assumed that several of these plovers were establishing winter habitats and overwintering on Guam, as had the birds in Johnson's study on Oahu.

GERRY ELLIS

After feeding the young for about four weeks, adult shorebirds, such as these ruddy turnstones, leave their northern Alaska nest site for the vast mudflats and beaches along the southern Alaska coast. There they feed on rich fauna to prepare for the flight over the Pacific. Some birds nearly double in weight, which helps ensure their arrival on islands as much as 4,000 miles away.

Since adult and juvenile shorebirds leave the northern nesting and feeding sites at different times, they should arrive at their island destinations at different times. On Guam we observed two periods of heavy migratory activity. The first, as we expected, occurred during late August and early September and consisted mostly of adult birds. The second period came about three to four weeks later, in early October, when we counted the largest number of migrants of the entire three-month period, a total of 742 birds at both observation sites. At this time, the juvenile birds outnumbered the adults by about 10 to one. The total number is not large compared with continental sites, but on Guam it represented a large migration. Migrations to small islands in the ocean occur in much smaller numbers than at continental sites, and involve fewer species as well.

After completing our work on Guam, we continued to follow the migrant shorebirds to their southernmost destinations in the Pacific. This took us to New Zealand and Australia, where we saw thousands of migrants, many of them different species from those we had seen on various intervening islands in the central and western Pacific. Some larger species, such as eastern curlew and great knot, are capable of flying longer distances between islands, perhaps as much as 4,500 miles. Neither of these two species is seen regularly on any of the islands in the central or western Pacific, and perhaps they caused some of the radar echoes we saw over Guam.

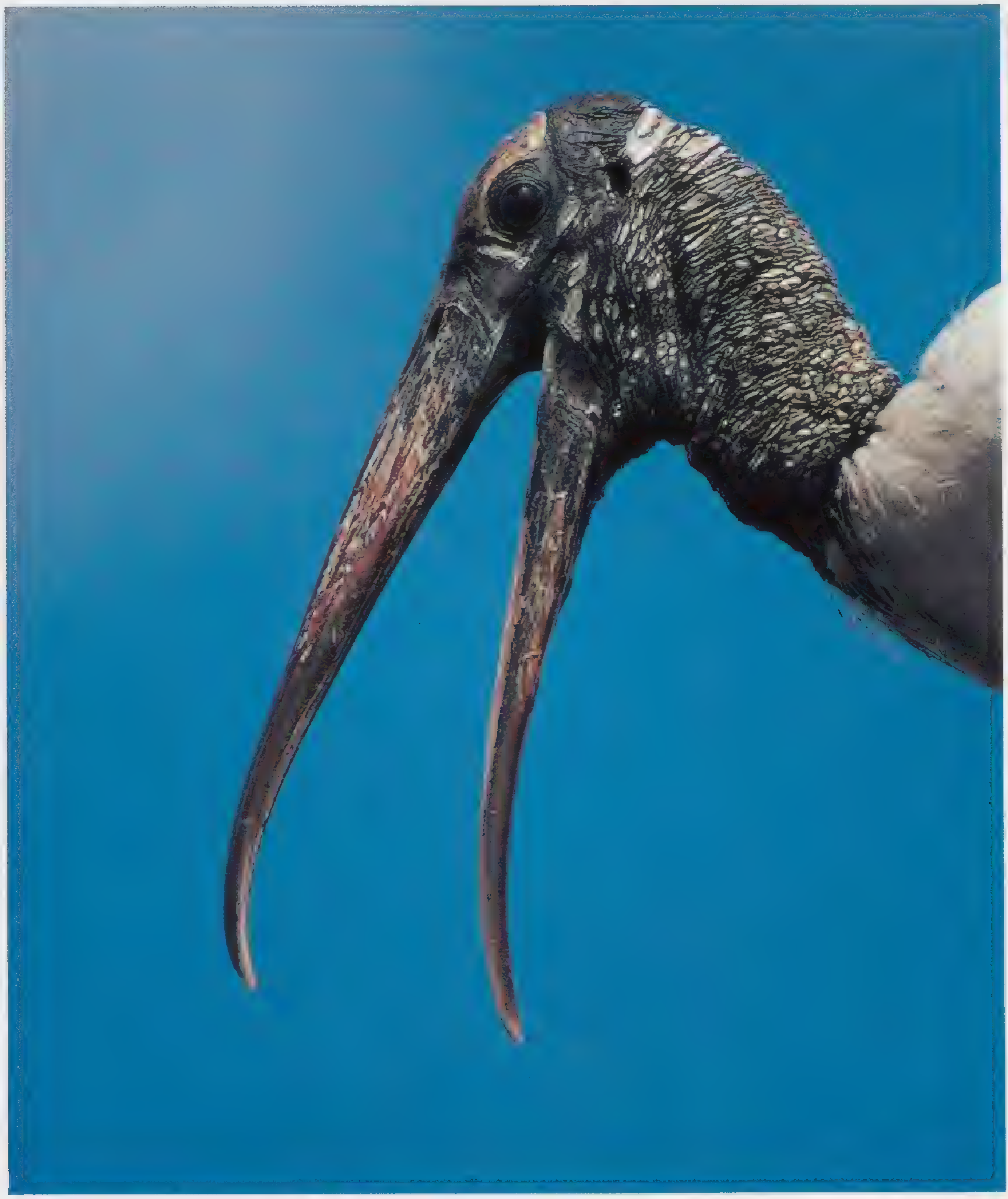
Our work in the Pacific is still in progress. During the fall of 1989 we will participate in the Semester at Sea Program, sponsored by the University of Pittsburgh. We will leave Vancouver on the S.S. *Universe* and cross the Pacific in mid-September during the height of the southward migration season. With permission from the captain, we hope to make radar observations of migrant birds in the northern Pacific. In addition to identifying the species that we observe while at sea, we will look for any birds that land on the ship. The ship will make several stops along the east coast of Asia during September and October, where we will be able to make field observations of the different species that fly along the Asian coast during fall migration. All this information should add greatly to our knowledge of the pattern of migration in the Pacific.

From the observations we have already made, we have found that to some extent different species of migrants appear on different islands in the Pacific. At least three things could contribute to this distribution. The first is geographic: birds nesting to the northwest of the Pacific tend to appear in the western islands; birds nesting to the northeast appear more often in the eastern islands. The second has to do with the size of the bird: larger birds can fly longer distances and therefore don't need to stop on intervening islands for food or rest. The third pertains to habitat: different species of birds need different kinds of feeding areas, and islands with rocky shores would attract different species than would sandy atolls.

Our studies in the Pacific have taken us to a variety of remote islands, hundreds of miles apart. How do migrant birds find such places? We know that birds have a compass sense, and our work has shown that by maintaining a constant compass heading they can reach the general area of their destination. Although islands in the middle of the ocean might seem remote to us, atmospheric conditions cause a large build-up of clouds over the islands, creating a much larger visual target than just the land mass of the island by itself. The chain of Hawaiian Islands, for example, is over 1,000 miles long, above which the clouds can reach a height of 20,000 feet. Once in the vicinity of the islands, the birds can use other cues, such as visual ones, to find a particular island.

Maintaining a constant course and using visual cues probably also aided our boatman in the middle of the storm. We did make it to Ant Atoll, where we found several species of migrant shorebirds. The smaller and more remote an island, the fewer migrants there are. But no matter how small an island or atoll is, some birds seem to find it regularly without the use of complex navigation, just as our boatman was able to find Ant Atoll. □

Janet Williams is senior research associate at Swarthmore College in Pennsylvania. She is currently teaching on the S. S. *Universe* somewhere in the Pacific.



LEE KUHN

STALK THE MUDDY WATERS

Most birds must see their prey to catch it. Not the American wood stork. Day and night it wades through the muddy plant-choked waters of the South's wetlands, sweeping its partially opened, touch-sensitive bill from side to side like a treasure hunter operating a metal detector. When the edge of the nine-inch bill encounters an edible—a fish, frog, snake, or even a young alligator—it snaps shut in reflex action. Elapsed time? 25 milliseconds, about as fast as a steel trap and just as forceful.

Although its reflexes are remarkable, the wood stork's plumage is rather ordinary. So when other, glamorous wading birds were hunted almost to extinction at the turn of the century for the befeathered hats of stylish Victorian ladies, stork populations remained robust. Fifty years ago more than 100,000 wood storks lived in their typically large colonies in Florida and adjacent states. But over the decades the tall cypress trees where the birds nest were cut down and sold for lumber and the swamps where they feed were drained. In 1984 the only species of stork that breeds in North America was listed by the federal government as an endangered species.

Today about 5,000 breeding pairs are left, and the habitat destruction continues. I traveled to a remote rookery in Florida's Myakka River Delta to capture this unusual close-up of the stork's superbeak. —**Lee Kuhn**

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Mockingbirds

The sounds of fall are different from those of other seasons. The calls of crickets and grasshoppers dominate—the irregular chirps of field crickets in grass, the measured, bell-like calls of snowy tree crickets in shrubs and trees, and the deep, sonorous calls of cave crickets in damp recesses close to the ground.

With insect sounds so pervasive, it is easy not to notice that most birds are fairly quiet in the fall. This is because they sing and call mostly when they need to interact with other birds, this need being greatest in spring when they are establishing territories, attracting mates, and raising young. Fall is a time of few social demands for most birds, and so they are generally quiet.

A notable exception is a bird whose songs fill the air on fall days, sometimes even into the night. It creates the illusion of many singing birds because it imitates the vocalizations of others. The bird, of course, is the mockingbird. But why do mockingbirds sing and call when other birds are quiet?

Mockingbirds' autumnal communication suggests that they are engaged in more complex social interactions than other birds. Starting in September, mockingbirds begin to define small territories that contain a source of food, such as berries, and to defend these territories throughout fall and winter. The mockingbird is one of the few North American bird species to do this.

Because mockingbirds reside in the suburbs of much of the United States, most of us do not have to go far to enjoy the many features of their territorial behavior. One aspect of this behavior that particularly interests us is their calls and visual displays that occur only in fall. The first sign of fall territorial behavior, for example, is the *chick-chick* call. We hear it in early September—a short, harsh sound given every one or two seconds for at least 10 minutes. We often hear it at dusk while the birds perch low and hidden in shrubbery. We do not know its function, but it may be some initial advertising of the bird's intentions to defend an area.

By mid-September, mockingbirds begin to sing from perches within their territories. The unusual feature here is that, while only males sing in spring, both males and females sing in fall. This is probably because females defend their own separate territories at this time.

From mid-September to mid-October the mockingbird makes two new calls—*ch'ch'chick* and *chewk*. The former is a rapid series of harsh notes and the latter is a single, loud, harsh sound. Neighboring male and female mockingbirds give these calls on two occasions: as they sit on perches within their territories, and during chases when they intrude on each others' space. These chases may also be accompanied by short, loud bursts of song.

ROBERT VILLANI

Mockingbirds are one of the few North American bird species that defend their source of food throughout fall and winter.

The final piece of mockingbird behavior that is peculiar to fall is what researchers have termed the border-dance. Two mockingbirds fly to the ground where they face each other with heads and tails raised. Then they hop back and forth and side to side in a slow, measured way. The dance may last for several minutes before the birds either fly off to a new spot along the shared border and resume this display or separate and fly back to their respective territories.

The border-dance seems to occur at adjoining territorial boundaries and may help the participating birds to reach an agreement on the final boundary line. Border-dances usually occur in late October and November, when most territories have been roughly defined.

These auditory and visual displays do not continue all winter. They occur until the birds have settled their territorial borders. After that the birds are quiet and rarely encroach on one another.

However, other bird species occasionally enter mockingbird territories. If the intruding species are berry-eaters, such as starlings or robins, the mockingbirds are likely to chase them out using the *chewk* call. If the intruders do not eat berries, then the mockingbirds probably will ignore them.

As you follow mockingbirds through fall and hear all of their noisy behavior, you will be amazed at how quiet they are the rest of the winter, once their territorial disputes have been settled. They sit so quietly in bushes that they are hard to spot. Then in spring you will hear the first bits of song being sung by the male from low within shrubbery. This marks the start of a whole new set of calls and visual displays that occur only in spring and have to do with acquiring mates and raising young.

Observing these changes in behavior can give you a deep understanding of the stages of a species' life throughout the year. When you begin to observe the mockingbird in fall, and then winter and spring, you will discover that a species can take on many different characteristics. Some behaviors come and go depending on the season, while others remain all year. In some ways, year-round behavior-watching is the only way to really know all the personalities of a species.

—Donald & Lillian Stokes

A Bird in the Poke

The physical properties of the spot aren't important.

KEN BRATE (PHOTO RESEARCHERS INC.)

You know of all the popular ones, the great ones, the ones that everyone else knows too. There's High Island, Texas, where the tide of spring migrants floods the treetops and saturates the air with wings. There's Sonora, Arizona, where thermometers reach for the sun and exotic birds and plants and insects stretch their tropical range northward. There are autumn's omega points—Cape May, and venerable Hawk Mountain, where the parades of southbound raptors pass in review. These places and others are all well known on the American birding circuit; all of them are codified and common knowledge.

But there's one more place, isn't there? One very special place that isn't described in any of the bird-finder's guides. It's not listed anywhere, except, perhaps, in your private journal. This is *your* place, the local patch, the one you call home turf.

Don't try to deny it. You needn't disclose the location. You and the spot are probably under some mutual spell anyway. If birders Tom, Dick, or Harriet stumbled upon it, they probably would find only a towhee or two anyway. And for heaven's sake don't make excuses for keeping the lid on a secret worth keeping. All birders have a special place that never lets them down and has produced more good birds, branch for branch, than Point Pelee on a morning in May.

It's the place that always holds a bird or two when everywhere else falls flat. The place that produces the bird that puts you in the spotlight when the Christmas Bird Count compiler lays down the challenge: "Does anybody have any species that I have not called?"

This special place can be counted on to plug the holes in your big day list, and at the end of a frustrating day with a visiting birder, it's the place you have in mind when you say: "There's one more spot where the bird might be."

The physical properties of the spot aren't important. The nature of special places changes with geography. In Arizona it might be a grove of cottonwoods surrounding a spring at the end of some blind canyon. In Connecticut it might be a wooded patch only two minutes off the interstate. In Minnesota it might be a marsh that draws vagrants the way a blue blazer draws lint. In Maryland perhaps it's a tidal flat visible from your office window.

I'm not sure I understand the yearning for a local patch when so many spectacular locations are only an airline terminal away. I just know it's important.

Maybe there is something atavistic about it, something territorial. Maybe, like the predators we once were and emulate still, we need to placate our genes by marking boundaries.

Have you ever noticed how sharp and quick you are on your home turf? Bird songs are never puzzling and *Accipiter* tails are invariably round or square (never the hybrid, in-between configuration as they are in other places). In this patch even the leaves are allies, and the *Oporornis* warbler hasn't been born that can defy detection.

Birding has grown in 20 years. A wealth of bird-finding guides has opened the continent to us. Poke birding has given way to birding by the book, but I wonder whether the excellence and bloodless precision of these guides has sapped their splendor.

Go 2/10 of a mile. Stop. Park near the dumpster. Walk toward the hot dog vender with the mole on his left cheek. Turn right where the bluetick hound is scratching for fleas. Stop at the hedge cut in the likeness of Yogi Bear. Kick the hedge. Bird will evacuate from Yogi's . . . ear.

The guides have taken the birds out of the bush and put them into our hands, but they have exacted a price. In cutting the rate on challenge, they have made discovery cheap.

Maybe a bird in hand is worth more than two in the bush. And a bird in the hand is certainly better than no bird at all. But a bird in *your* bush—that very special bush in that very special place—ah, that bird is beyond price.

—**Pete Dunne**

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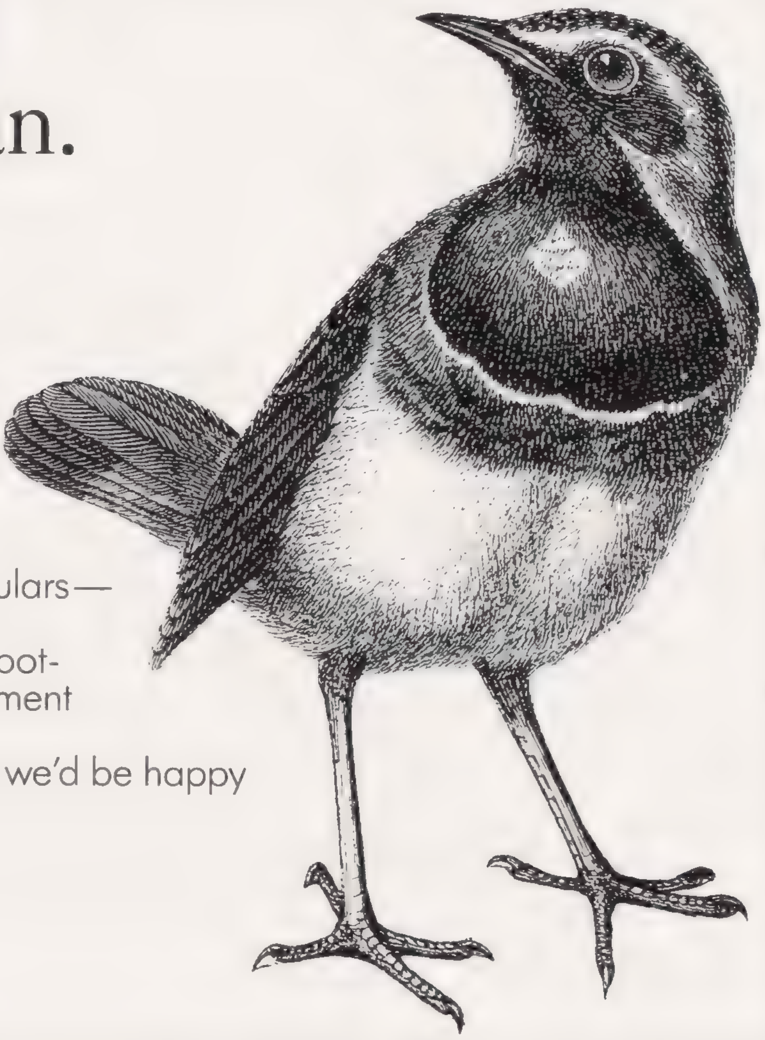

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Quarterly

Winter 1990

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Photo of Western Flycatcher
by Greg R. Homel

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THE LIVING BIRD *Quarterly*

Cornell Laboratory of Ornithology Winter 1990/Vol. 9 No. 1

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Cover: Rainbow lorikeets, among the most colorful of Australian parrots. The gaudy plumage actually provides good camouflage: the green back blends in with foliage while the blocks of bright color on the underparts break up the outline of the body. Photograph by Jean-Paul Ferrero (AUSCAPE International).
Back cover: Golden-shouldered parrots nest in termite mounds that dot the black-soil flats of Australia's remote Cape York Peninsula. The parrots tunnel into the mound and excavate a nesting chamber, often rearing two broods a season. Photograph by Stanley Breeden/DRK Photo.
Right: Dawn dishwashing detergent is the best solvent for removing oil from feathers. Photograph by Michael Baytoff.

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The Bitter with the Batter

You appear to be hard-pressed for good material. . . . "Day of the Migrating Headache" (Summer 1989) . . . should have been consigned to your circular file.

Oliver Hewitt
Charlotte Harbor, Florida

My warblest confabulations to the Armstrongs' "Day of the Migrating Headache." I'm just a sapsucker for good "ornithinglish." Owl soon willet be unteal another story like chat appears?

Veery towhee yours,
Stephanie Singer
Santa Cruz, California

Although I finched at some of your puns, I was laughing gull the way through your cuckoo tail.

Take care of ousel,
Sally Swartzmiller
Selkirk, New York

G. MICHAEL McHUGH

Antonio Torres, city birder.

Antonio Springs Forward Leader Falls Back

I thoroughly enjoyed "Birding with Antonio" (Summer 1989). When I read that "the leader [of the tour] saw a hooded mountain-tanager and told me to look at it through his binoculars," I nearly fell over backward. I was that leader.

I am glad that we turned Antonio into a birder. As you said, it was his first bird-watching tour, a fact that had initially disturbed us, but everything turned out well in the end because he was so accommodating and helpful.

I enclose a slide of Antonio from that trip. He was quite properly dressed for "city" touring when the photo was taken near Quito, but relaxed as we progressed to more remote regions.

G. Michael McHugh
Ithaca, New York

Somewhere, Out There

I found Jack Connor's "New Gulls from the Old World" (Winter 1989) very interesting in light of my experiences at Long Point, Ontario. I believe that P. A. Buckley, one of Mr. Connor's leading sources, is a bit hasty in predicting that the little gull "may already be declining."

The little gull is common at Long Point for much of the year. On August 9, 1985, 135 were seen on the south edge of the Long Point Company marsh. In 1987, the Long Point area set a North American Christmas Bird Count record for little gull with 43. On the 1988 Christmas Bird Count, Long Point Bay was frozen and we recorded zero little gulls; however, this disappointment was more than offset by the 266 we had observed on November 6. To my knowledge, this is the largest concentration ever reported in North America.

Data from the *Atlas of the Breeding Birds of Ontario* (1987) indicate that a large proportion of these gulls must be breeding in North America. Of 13 locations in which little gulls were found, three produced confirmed breedings, and, as D. V. Weseloh commented in the atlas, "extensive areas of coastal marshes and rivers where breeding could occur were not covered during the atlas period."

It would be easy to lose 50 or 100 pairs of little gulls in the 350,000 square kilometers of the Hudson Bay and James Bay lowlands. They are out there somewhere!

George E. Wallace
Port Rowan, Ontario

FROM BIRD POPULATION STUDIES

Can birds live and breed successfully on American farms? Conservationists and farmers have been struggling with this question for decades. The reason for the prolonged pondering is that the answers seem to change as farming changes. A drop in a given bird population, for example, might be attributable to the fact that the average size of a cornfield has increased over the past 25 years; as a result, bird-friendly natural habitats — wetlands, prairie grasses, shrubs, and woodlots — have shrunk. On the plus side, however, willing farmers, in cooperation with the U.S. Department of Agriculture, have removed farmland from cultivation all over the country under the Sodbuster and Swampbuster programs. These actions could result in better habitats for birds.

Few ornithologists have studied birds' breeding success on farms, but now we at BPS, along with Dr. Raymond O'Connor of the University of Maine, have received a grant from a group of six agrochemical companies to pursue the subject. With funds from the grant we hope to provide quantitative data on the productivity of more than a dozen common species that nest in both agricultural and nonagricultural habitats, including the eastern bluebird, American robin, tree swallow, and killdeer.

We plan to extract the data from the more than 300,000 nest record cards that we have received from BPS volunteer cooperators over 25 years. On these cards our volunteers have recorded the number of eggs and young a pair has produced, and whether or not the nest is active or abandoned. This is exactly the type of information that will help us to determine the ability of adults to raise young on farms and in nonagricultural settings throughout the contiguous United States.

A committee of individuals from the Environmental Protection Agency, U.S. Fish and Wildlife Service, agrochemical companies, National Audubon Society, National Wildlife Federation, and others will review our progress on the project and offer advice. Members of the group are in the position to promote changes in agricultural practices that could improve the ability of a pair of prairie songbirds to raise a nestful of healthy young.

Greg Butcher, Director, Bird Population Studies

A Grain of Death

The EPA has proposed a ban on granular carbofuran, a pesticide deadly to birds, which is widely applied to corn and rice. The agency has documented deaths from carbofuran ingestion for 35 different bird species, including Canada geese and cattle egrets. Birds may mistake the granules for seeds or grit, and a single granule can kill a blackbird.

The EPA proposed the ban in January 1989 and will decide whether to ban the pesticide this winter. If the agency does cancel the registration, the manufacturer, FMC Corporation, will appeal the decision. FMC asserts that few reports of carbofuran-caused bird deaths have been verified. Also, carbofuran is the only pesticide effective against rice weevils; one Texas agronomist predicts rice yields will decline significantly if carbofuran can't be used to combat the pests.

Ironically, banning carbofuran to protect birds may increase risks for humans. Farmers use granular carbofuran because the granules pose minimal inhalation and skin contact hazards compared with other pesticides, including liquid carbofuran, which would not be affected by the ban.

Some biologists say that carbofuran need not be banned: the danger to birds can be reduced if farmers mix granules into the soil and keep edges of fields, where most birds feed, pesticide-free. But these measures would triple application costs.

The carbofuran case is one more environmental issue that is more gray than black and white. If the EPA does ban granular carbofuran, farmers will switch to other, equally toxic pesticides. And to prevent economic disaster for rice growers, the EPA will probably grant them an exemption from the ban, even though most bird deaths have been documented in rice fields.

Hotline Poison

A hotline for reporting pesticide poisonings is providing scientists with useful information on suspicious wildlife deaths. The hotline is a joint effort of the EPA and Texas Tech University. Reports phoned in by birders, hikers, and others help the EPA identify locations where problems seem to be the most severe. The agency follows up with monitoring and review efforts. Last year the hotline received nearly 25,000 calls from all 50 states and several foreign countries.

The Poison Patrol, a citizen involvement program launched by Defenders of Wildlife, encourages people to report wildlife poisonings even when caused by the legal application of pesticides. When you suspect that a bird or other animal has been poisoned, here are some questions to consider. Are the animals found near agricultural fields, or edges of woodlots, streams, or golf courses—places where pesticides are commonly applied? Can you rule out other causes of death, such as unusually cold weather or electrocution from nearby power lines?

When you call the hotline, be prepared to provide location, species, number of animals found, a description of the habitat, and specific signs of poisoning. Remember, when investigating a suspected poisoning, never touch the dead animal. The hotline number is (800) 858-7378.

—*David L. Robinson*

Birds Do It, Cows Do It

What tropical bird has a digestive tract like a cow's? The hoatzin, a pheasant-sized bird from Venezuela, according to Alejandro Grajal of the University of Florida, Gainesville, and his collaborators.

In a study published in the September 15, 1989, issue of *Science*, the researchers report that the hoatzin grinds its vegetarian meals—buds, shoots, and new leaves—using horny ridges inside its enlarged crop. The particles are digested in the crop through a bacterial fermentation process. The whole process is functionally and biochemically similar to that of cows and other ruminants.

Before Grajal and his colleagues published their findings, scientists thought that only mammals possessed such specialized digestive tracts. The fermentation process wasn't believed to be efficient enough to meet birds' high energy demands. But fermentation works for the hoatzin because it eats only the most nutrient-packed vegetation.

Its digestive tract isn't the only characteristic that distinguishes the hoatzin from other exotic species. Its breastbone, to which the flight muscles attach, is small for a bird of its size, so the hoatzin is a poor flyer. Also, young birds possess functional claws at the bend in their wings, which allow them to clamber about the bushes of their riverbank habitat.

DNA Polishes Dusky Genetics

The death of the last dusky seaside sparrow in 1987 did not represent the extinction of a species, but merely one population, new research suggests. John Avise, a geneticist at the University of Georgia, has shown that the dusky was genetically almost identical to the three other Atlantic coast subspecies of seaside sparrow.

When the taxonomy of seaside sparrows was first established in the 1870s, scientists relied upon visible characteristics such as beak shape and plumage color to classify separate species of birds. Avise's technique used mitochondrial DNA—genetic material found outside the cell nucleus—to determine how closely duskies were related to other seaside sparrows. The new subcellular technique is useful for determining when in their evolutionary histories populations actually became separate species.

The study has raised questions about the decision made in 1980 to remove the last duskies from the marshes of Brevard County, Florida, for a captive breeding program. Avise suggests the resources that were used in this effort might better have been spent to protect all the Atlantic seaside sparrow subspecies, or some other species that has no populations of genetic twins.

A Woeful Loss

Michael Harwood, conservationist, nature historian, board member of Hawk Mountain Sanctuary, winner of the National Science Writers Award and the William Burroughs Award, author of several books, including *On the Road with John James Audubon, View from Hawk Mountain,* and *The View from Great Gull,* frequent contributor to *Audubon, Harper's* and *The Living Bird Quarterly,* birder, and coplanetarian, died November 24, 1989, of an embolism at the University of California San Diego Medical Center, where he had undergone arterial surgery. He was 55 years old and a resident of Washington, Connecticut.

We are deeply grieved by his passing, and wish to express our condolences to his wife, Mary.

The Editors

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KENNY'S TIPPERARY

Michael Harwood

Recently I clipped a newspaper article about a restaurant in Oregon. Its specialty was breakfast, and it sounded like a perfect place to stop on a birding expedition. I soon decided that I already had enough scraps of paper filed in my office and since I live in Connecticut I wasn't likely to be in the neighborhood of the Oregon restaurant very often, so I sent the clipping to a friend in Washington State. But the underlying impulse remains intact. The ancillary aspects of bird trips—the night at the eccentric motel, the weekend of self-education in how to back a boat trailer without breaking the auto's taillights and denting the fenders, the restaurant where the food was so good you took on enough fuel at breakfast to last you for two days—can be as memorable as the birding. Sometimes more.

Which brings me to the subject of Kenny's Tipperary. When the Professor and I were still living in Gotham, about 20 years ago, we and a few birding friends used to celebrate the turn of a new year with a weekend trip to Montauk Point, at the eastern tip of Long Island. We could start building our year lists with loons, sea and bay ducks, mergansers, maybe guillemots, northern hawks and owls, and such beach birds as sanderlings and dunlins and horned larks and snow buntings. I remember those weekends as featuring black-and-white birds in tan, dark green, gray, and white settings. Also we often got blown around a lot by icy winds; very invigorating.

At the outer end of the island in those winters, public accommodations were scarce and sometimes the ones we could afford were barely bearable. The motel we picked as our Saturday stop on the weekend under discussion, for instance, turned out to be the local house of assignation, and we were wakened frequently throughout the night by the sounds of cars stopping, cars starting, car doors and motel doors slamming, people laughing and shouting, bottles breaking.

Meanwhile, we had to find a place to buy supper, and the motel's henna-haired hostess, who had stuffed herself into a low-cut knit purple top and knit turquoise pants for the evening, at first looked baffled and then, with considerable uncertainty, directed us down to the harbor, to a bar and restaurant called Kenny's Tipperary. She was fairly sure it was open, she said. She was not so sure we could actually get a meal there in January.

Neither was the slightly sauced Irish waiter who chummily sat down at our table to take our orders. We wanted steaks, we told him, and he and the bartender held a confab on the subject of whether steaks were to be had. With the question still open, the waiter repaired to the kitchen, having first provided drinks so that we could start to catch up to him. The "we," I should say, included the Farmer's Daughter and the Flower Girl, both of whom had good singing voices, which as you will presently see is important to the story.

Kenny's was dark and barnlike, sized to accommodate large summer crowds. About a dozen other customers occupied the bar along one wall in a glow of dim light. Each of the wooden front tables was also dimly lit, and brighter light splashed the two green pool tables across the room from the bar. At first glance the place looked forlornly empty on this winter's eve. We quickly became aware, however, that we had stumbled in on an evening of special festivities.

Kenny's was frequented at this season by transplanted Europeans—fishermen and probably a few potato farmers, most of them Irish or Scottish. Hunched on a stool at the bar, wearing a brown Stetson and no teeth, looking strikingly like "Cactus Jack" Garner (Franklin Roosevelt's first vice president—the one who described the vice-presidency as not worth a pitcher of warm spit), was a Scot celebrating his 80th birthday. His friends, in the way of immigrants and sailors with an ocean lying between themselves and home, were serenading him with Scottish and Irish songs.

The Professor and I took our drinks to one of the pool tables and began a game of eight ball. The singers at the bar sang mostly ballad solos about love and heroes and tragedies and home. During a pause in their concert, I suggested to the Professor that he and I reciprocate. We had been playing music and singing together since our freshman year in college, and we knew four or five barbershop quartet songs and spirituals that we sang pretty well as duets. I believe we began with "Aura Lee," all the while going on with our game of eight ball.

The effect must have been striking. I can't say for sure; neither of us dared look up. But imagine the scene from the perspective of the patrons at the bar: here were these two strangers, shooting pool under the bright lights across the room, nonchalantly singing away loudly in two parts as if they were on stage in some musical comedy. In fact, after we had finished the song the waiter asked the Flower Girl and the Farmer's Daughter if they and we were a "troupe."

The steaks that finally reached our table had clearly been long-term residents of the Kenny's Tipperary freezer and were somewhat around the bend. But no matter. For the rest of the evening Scottish and Irish songs alternated with the likes of "Good-bye, My Coney Island Baby" and "Swing Low, Sweet Chariot." The Flower Girl, who knew dozens of Scottish and Irish songs, cemented our fast friendship with the regular patrons by leaving our table and going to the bar to sing to the guest of honor "Bonny Mary of Argyll" with one of the resident tenors. Eventually we were all singing folk songs and parlor songs known on both sides of the Atlantic, and when our "troupe" left—long before closing time, because of course we had to rise at first light or be turned into herring gulls—the congregation was singing "There's a Long, Long Trail A-winding." As we opened the door to file out into the cold night, we were still singing: "There's a long, long night of waiting until our dreams all come true—'til the day when I'll be going down that long, long tra-il with you." Our waiter had followed us to the door, and as we left he and we had tears in our eyes.

Frankly, other than the noisy night that followed at the motel, I don't remember much else about that weekend. The Professor, who can call up hours of birding-trip replay once he's looked at his old field card or notebook, has mislaid his *aide memoire* for that expedition. My field card is long gone to the recycling center because I had put down only meaningless tick marks, no numbers or notes. The Professor remembers our seeing many light-phase rough-legged hawks soaring low over the dunes and ponds, and I have a faint recollection of that, but the memory could represent another Montauk weekend altogether.

What I do remember is that when we drove out to the eastern end of Long Island the next January we brought the Professor's violin and my guitar. But once we were in the neighborhood we decided we couldn't hope to duplicate the spontaneity of the experience, especially if we walked in with our instruments, ready to perform. And maybe no one would be there from the year before, and it would all be a dud. We never went back to Kenny's Tipperary. □

TALE OF ANCIENT WING

James L. Hayward

Archaeopteryx, *ancient wing, is a bird in the process of shedding its reptilian skin. Here Rudolf Freund depicts this vision and James Hayward portrays a wordscape of the lizardlike creature whose feathers pushed bird evolution into public controversy.*

A small lizard slowly awakens as the sun rises over the Jurassic landscape. The lizard, stiff and lethargic, crawls to a sunlit rock to warm its night-chilled body in preparation for the day's hunt. As the temperature rises the ever-present insect throng strikes up its monotonous midsummer symphony. Crocodiles haul out of the nearby river and flying reptiles circle overhead in search of victims.

This Bavarian coastal bushland is not dense, but contains a variety of conifers, ginkgoes, and fernlike cycads. An occasional small, mouselike mammal darts beneath the foliage. Wasps and flies buzz around the corpse of a decaying turtle, and roaches, beetles, and crickets scurry through the leaf litter.

Now warm and supple, the lizard moves toward a clump of cycads to forage. A disturbance from above, however, forces it to freeze. A dark figure swoops down from a nearby ginkgo. With toothed jaws it firmly grasps the lizard at midsection and tenderizes its body. It swallows the lizard, then scrambles back to its perch to preen its plumage.

What is this intruder that ruined the lizard's day? *Archaeopteryx*, ancient wing, denizen of the tropical lowlands that border Bavaria's Solnhofen Lagoon. The pigeon-sized bird is an odd creature. In some ways it resembles its lizard prey: toothed jaws, long bony tail, and clawed fingers — all reptilian characteristics. But one feature sets *Archaeopteryx* apart from all other animals — its feathers. Unlike the flat, rigid scales of reptiles, its feathers are loosely layered to provide an insulating cover. Even in cool weather *Archaeopteryx* is warm and active.

The front limbs are both birdlike and reptilian: when *Archaeopteryx* leaps from its perch, the feathered wing surfaces lift it for flight. When climbing and scrambling among the branches, the wings act as forearms with three clawed finger bones at the bend of each wing.

In addition to feathers and wings this remarkable animal possesses another birdlike characteristic: a wishbone. The two collarbones in most reptiles are independent and help to support the forelimbs. In *Archaeopteryx* the bones are fused, forming the wishbone. These bones are attached at one end to brace the shoulders during the downstroke of the wings.

The seasons come and go. A now aging *Archaeopteryx* perches in a gingko, quietly preening its feathers. It has parented its share of downy chicks and done its part to limit the lizard population. It is older and slower, not as alert as in the good old days when it hunted in the morning sun. For sustenance it depends increasingly on carrion that washes up along the shore of the lagoon.

One summer day *Archaeopteryx* begins to make its rounds over the lagoon in search of food. Weakened by age, balance shaky, a sudden gust catches its tail and tosses it headlong into the water. It tries in vain to regain flight. Exhausted, it finally drowns. The limp, water-laden form sinks beneath the surface and falls to the bottom of the lagoon. There it lies atop the mud at the base of a gentle incline.

It's been a hot, dry summer in Solnhofen, and evaporation has left the lagoon unusually salty. The salt has killed the bacteria, burrowing worms, sea urchins, and crustaceans that normally inhabit the basin floor. The abundant supply of shrimp, algae, and fish is gone. Usually corpses that have fallen into the lagoon are quickly devoured by scavengers, but in this sterile brine *Archaeopteryx* remains untouched.

Presently a routine event occurs that will alter the history of science. A moderate earthquake loosens a mass of mud upslope and sediment slips down the incline. In a minute it is calm again. For eons *Archaeopteryx* is entombed in limy mud that will turn to stone.

1861. A quarry worker in Langenaltheim, Bavaria, spots an unusual shape sticking out of the fine limestone he mines. Cautiously, he splits the slab and finds a compressed skeleton. Though no fossil expert, he suspects that it may be of some value. Dr. Karl Haberlein, district medical officer and local fossil buff, is given the specimen and offers to sell it to various museums. Richard Owen, director of the British Museum, reads a description of the fossil and negotiates its purchase.

No bird has ever been found in such an old rock layer, and no person is more delighted by the find than

(continued on page 13)

Painting by Rudolf Freund. Courtesy The Carnegie Museum of Natural History

Thomas Huxley (1825–95), British biologist and Darwin's Bulldog. The Bettmann Archive, Inc.

BETWEEN BIRD AND REPTILE

Charles Darwin is considered the father of evolutionary theory, but his retiring nature kept him from participating publicly in the great controversy that followed publication of The Origin of Species *in 1859. He left the public defense of his theory to others. Chief among them was the eminent biologist Thomas Henry Huxley, sometimes called "Darwin's bulldog" for his aggressive advocacy of the theory. In the following account, adapted by D. R. Otis from an article appearing in the 1868* Annals and Magazine of the Natural History Society of London, *Huxley relied on recently discovered* Archaeopteryx *fossils to address a crucial question raised by critics of evolutionary theory: If today's life forms evolved from those of earlier eras, where are the transitional forms that came in between?*

ON THE ANIMALS WHICH ARE MOST NEARLY INTERMEDIATE BETWEEN BIRDS AND REPTILES

Those who hold the doctrine of evolution (and I am one of them) conceive that there are grounds for believing that the world, with all that is in it and on it, did not come into existence in the condition in which we now see it, nor in anything approaching that condition.

On the contrary, they hold that the present conformation and composition of the Earth's crust, the distribution of land and water, and the infinitely diversified forms of animals and plants which constitute its present population, are merely the final terms in an immense series of changes which have been brought about, in the course of immeasurable time, by the operation of causes more or less similar to those which are at work at the present day.

It is admitted on all sides that existing animals and plants are marked out by natural intervals into sundry very distinct groups: insects are widely different from fish, fish from reptiles, reptiles from mammals, and so on. And out of this fact arises the very pertinent objection, How is it, if all animals have proceeded by gradual modification from a common stock, that these great gaps exist?

We, who believe in evolution, reply that these gaps were once nonexistent; that the connecting forms existed in previous epochs of the world's history, but that they have died out.

Naturally enough, then, we are asked to produce these extinct forms of life. Among the innumerable fossils of all ages which exist, we are asked to point to those which constitute such connecting forms.

Our reply to this request is, in most cases, an admission that such forms are not forthcoming; and we account for this failure of the needful evidence by the known imperfection of the geological record. We say that the series of formations with which we are acquainted is but a small fraction of those which have existed, and that between those which we know there are great breaks and gaps.

I believe that these excuses have very great force; but I cannot smother the uncomfortable feeling that they are excuses.

You will not be surprised, therefore, if I take this opportunity of pointing out that the objection to the doctrine of evolution, drawn from the supposed absence of intermediate forms in the fossil state, certainly does not hold good in all cases. To superficial observation no two groups of beings can appear to be more entirely dissimilar than reptiles and birds. Placed side by side a Humming-bird and a Tortoise, an Ostrich and a Crocodile offer the strongest contrast, and a Stork seems to have little but animality in common with the Snake it swallows.

Careful investigation has shown, however, that these obvious differences are of a much more superficial character than might have been suspected, and that reptiles and birds do really agree much more clearly than birds with mammals, or reptiles with amphibians. But still, "though not as wide as a church-door or as deep as a well," the gap

between the two groups, in the present world, is considerable enough. How far can this gap be filled up by the records of the life of past ages?

This question resolves itself into two: 1. Are any fossil birds more reptilian than any of those now alive? 2. Are any fossil reptiles more bird-like than living reptiles? I shall endeavour to show that both these questions must be answered in the affirmative.

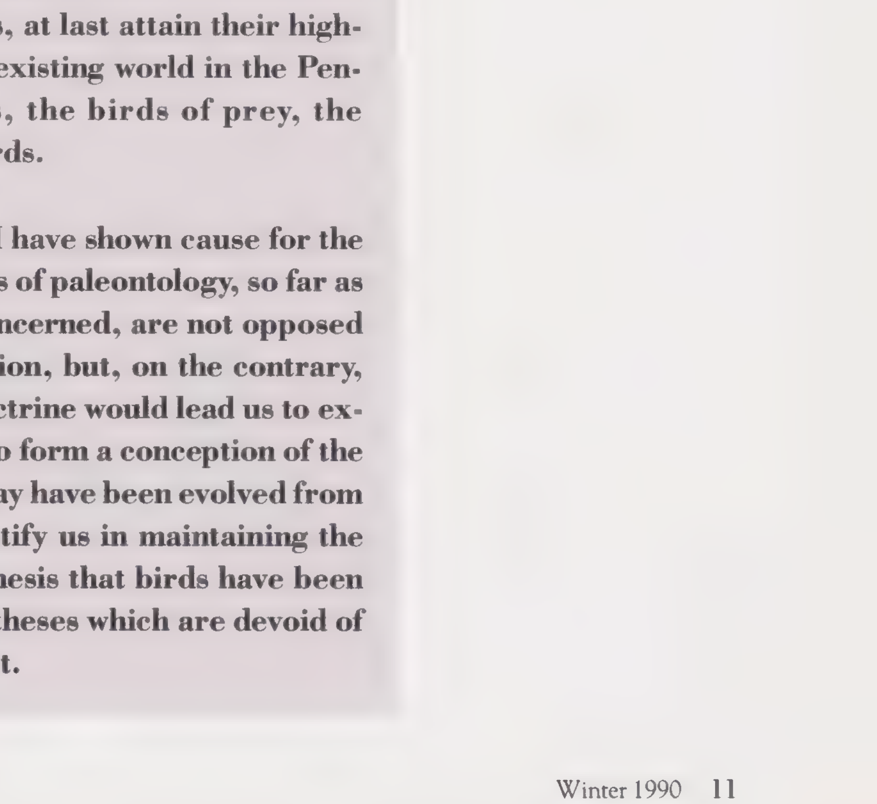
The very fine mud of the ancient sea-bottom which has now hardened into the famous lithographic slate of Solnhofen, in 1861 revealed the impression of a feather to the famous paleontologist Hermann von Meyer. Von Meyer named the unknown bird to which this feather belonged *Archaeopteryx lithographica*, and in the same year the independent discovery by Dr. Haberlein of one precious skeleton of the *Archaeopteryx* itself, which now adorns the British Museum, demonstrated the chief characters of this very early bird.

Now, what is this *Archaeopteryx* like? Unfortunately the skull is lost; but the leg and foot, the pelvis, the shoulder-girdle, and the feathers, so far as their structure can be made out, are completely those of existing ordinary birds. On the other hand, the tail is very long, and more like that of a reptile than that of a bird in this respect. Two digits have curved claws, much stronger than those of any existing bird; and, to all appearances, the hand bones are quite free and disunited.

Thus it is a matter of fact that, in certain particulars, the oldest known bird does exhibit a closer approximation to reptilian structure than any modern bird.

Are any fossil reptiles more bird-like than those which now exist?

A single specimen, obtained from those Solnhofen slates to the accident of whose existence and usefulness in the arts paleontology is so much indebted, affords an approximation to the "missing link" between reptiles and birds. This is the singular reptile which has been described and named *Compsognathus longipes*. Notwithstanding its small size (it was not much more than two feet in length), this reptile must, I think be placed among, or close to, the *Dinosauria* whose hindquarters wonderfully approach those of today's birds in general structure; but *C. longipes* is still more bird-like than any of the animals which are ordinarily included in the *Dinosauria*. It is impossible to look at the conformation of this strange reptile and to doubt that it hopped or walked, in an erect or semi-erect position after the manner of a bird, to which its long neck, slight head, and small anterior limbs must have given it an extraordinary resemblance.



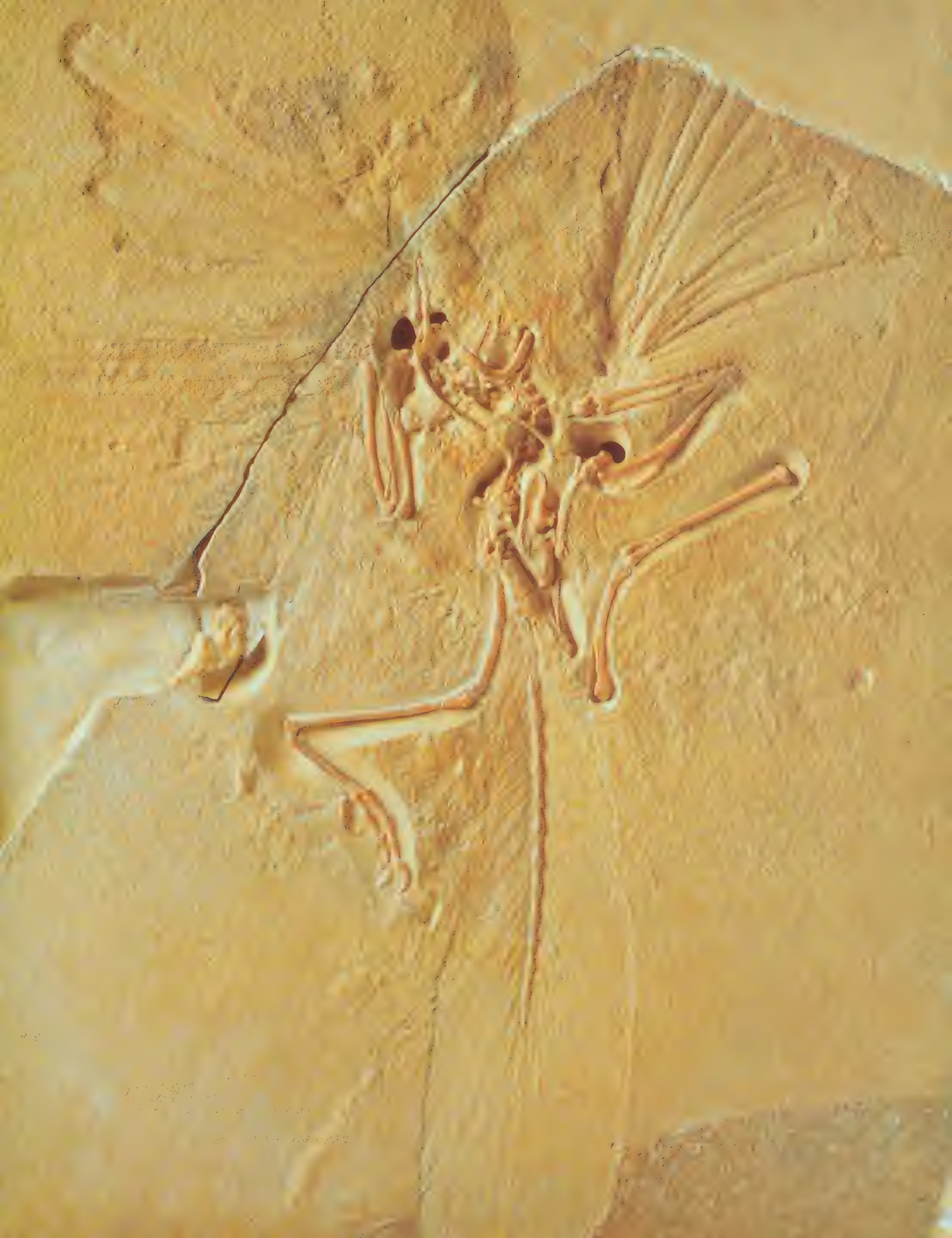
Archaeopteryx *as ground dweller*

Archaeopteryx *as tree dweller*

I have now, I hope, redeemed my promise to show that, in past times, birds more like reptiles than any now living, and reptiles more like birds than any now living, did really exist.

But if, on tracing the forms of animal life back in time, we meet, as a matter of fact, with reptiles which depart from the general type to become bird-like, surely there is nothing very wild or illegitimate in the hypothesis that the phylum of the class Aves has its root in the Dinosaurian reptiles—that these, passing through a series of modifications and differentiations, at last attain their highest specialization in the existing world in the Penguins, the Cormorants, the birds of prey, the Parrots, and the song-birds.

In conclusion, I think I have shown cause for the assertion that the facts of paleontology, so far as birds and reptiles are concerned, are not opposed to the doctrine of evolution, but, on the contrary, are quite such as that doctrine would lead us to expect; for they enable us to form a conception of the manner in which birds may have been evolved from reptiles, and thereby justify us in maintaining the superiority of the hypothesis that birds have been so originated to all hypotheses which are devoid of an equivalent basis of fact.



Charles Darwin, who had just published his controversial *Origin of Species*. To Darwin, *Archaeopteryx*—with its reptilelike teeth, bony tail, feathers, and clawed fingers—is a "missing link," a previously undiscovered evolutionary intermediate between reptiles and birds.

Archaeopteryx rests for more than a century among the most celebrated treasures of the British Museum.

1985. Four more fossil skeletons of *Archaeopteryx* have been discovered as well as a fossil feather, all from Solnhofen limestone. Despite scholarly skirmishes over the evolution of feathers and flight, no one questions the fact that *Archaeopteryx* was an early bird. Indeed, what else could it be in the face of those feathers?

A dinosaur fossil, says Sir Fred Hoyle, renowned British astronomer and science fiction writer, and colleague Chandra Wickramasinghe. Hoyle and Wickramasinghe photograph the British Museum's specimen of *Archaeopteryx* and claim that the feather impressions are fake. To areas around a small dinosaur fossil, they say, the perpetrator applied a limestone paste, then pressed modern feathers into it to create the impressions. What is the evidence?

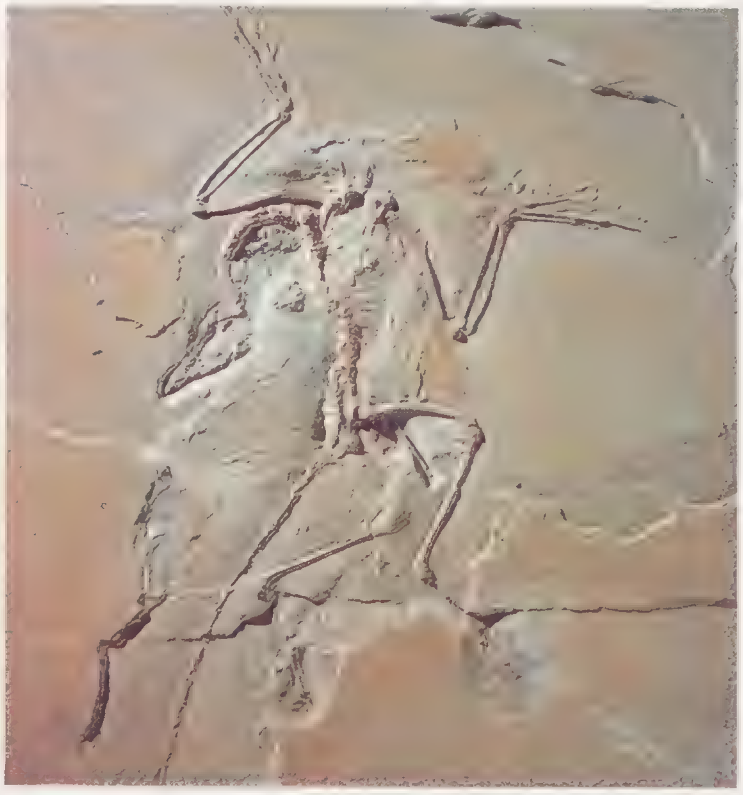
Hoyle and Wickramasinghe present three charges against the validity of the fossil. First they assert that the surfaces of the slab and counterslab—the two flat pieces of rock which resulted when the original limestone slab was split—do not match. Second, the limestone of the feathered and unfeathered areas of the slabs differ as if a paste had been applied only to the feathered areas; and third, 19th century fossil collectors would have had a very difficult time exposing feather impressions considering the hardness of the rock and the crudeness of the tools.

In response to these allegations, paleontologists at the British Museum carefully reexamine their fossil. They take the charges one by one and find that, indeed, the slab and counterslab do not match; this is because some limestone was removed from the slab to expose more of the fossil. The museum scientists also acknowledge the differences in surface texture of the rock, but believe they were created by *Archaeopteryx's* carcass pressing against the limy mud before it hardened. Finally, they recognize that limestone is very hard, but note that because it is also slatelike and brittle, it easily flakes away during specimen preparation.

The most irrefutable fact against the notion of forgery, however, is the hairline cracks in the slab and counterslab. These cracks were present before the slabs were split apart. The cracks are filled with crystals, right up to the surface. Rock specialists certify that these crystals never could have formed in the century, especially under dry museum conditions, proving the fallacy of the forgery hypothesis.

If the two astonomers had restricted their claims to the scientific community, the famous fossil could have been comprehensively analyzed and the charges quietly confirmed or rejected. But Hoyle and Wickramasinghe present their case in a photographic journal and the popular press. Predictably, they create a stir.

1987. Despite the evidence, the battle between paleontologists and the two astronomers continues to rage. Because the feud has provoked widespread public interest, the British Museum decides to let the people judge the fossil for themselves. An exhibit called "The Feathers Fly! Is *Archaeopteryx* a Fake?" opens August 14. Thousands of curious spectators file by the display. Most are convinced of the fossil's authenticity; a few continue to side with Hoyle or remain unsure.



The controversial fossil exhibited in the British Museum, far left. Is it genuine or did a forger press a modern feather into the limestone slab? Left, this Berlin specimen is so complete it leaves no doubt that Archaeopteryx's *feathers look the same as those of a contemporary bird.*

Left, Courtesy British Museum (Natural History). Right, P. J. Green (Ardea Photographics).

Meanwhile, in November a worker at the Jura-Museum in Eichstätt, West Germany, finds another specimen of *Archaeopteryx*, this one the sixth. It had been collected by an amateur who had misidentified the specimen as a small dinosaur. Peter Wellnhofer, a paleontologist in Munich, describes the specimen in the scientific literature. Most significantly, imprints of feather shafts from the left wing can be seen, affirming that *Archaeopteryx* had feathers.

1990. The question of whether or not *Archaeopteryx* had feathers seems to be settled for now, but much is still unknown about this animal. What were its ancestors? How long did it survive? Why did it become extinct? Was it ancestral to modern birds? How well did it fly?

Future discoveries may supply some answers. One thing is certain. The reptilelike bird that climbed the primeval shrubs on its four clawed limbs and glided from place to place on feathered wings will continue to fuel debates and fire the imaginations of those who study ancient birds. □

James Hayward, who researches fossil eggs and living birds, is a professor of biology at Andrews University, Berrien Springs, Michigan.

Further Reading

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ONE ON ONE

Constance Perenyi

A woman began as an artist steeped in the love of nature and wound up in an emergency oil spill clinic washing off sticky petrochemicals from the feathers of hundreds of birds.

What I remember most is the smell. Even now one whiff of Dawn dishwashing detergent and I am no longer standing at the kitchen sink but in a large gymnasium filled with frightened animals. I have volunteered to care for birds after three major oil spills off the coast of Washington. And while I am a veteran of sorts, I still have no idea who discovered the multipurpose utility of Dawn. I do know it is the best solvent to remove oil from feathers and fur. Pumped by the gallon, this pungent blue liquid is vital to rescue efforts. It can also trigger memories.

My recollections of the most recent Washington spill had just begun to fade when the *Exxon Valdez* went aground in Alaska last March. At first I tried to ignore details of the disaster presented by the media, but I was haunted by a familiar scene. I could imagine the rows of oil-soaked birds held in paper bags and boxes, could almost feel the steam rising from soapy washtubs. From my own experience, I knew what volunteers in Alaska were doing for the injured animals, but I could not fathom the scope of their efforts.

On a larger scale, Prince William Sound on Good Friday looked much like stretches of the Washington coast after four Christmas-week spills during the last five years. Different circumstances, different amounts of oil, but the same pictures of once-pristine environments now stained beyond recognition.

These were certainly not the images that first led me to work with birds. I began as an artist, trained in visual composition and steeped in love of nature. For years, my work was abstract, the birds and other animals implied but obscure. Dissatisfied, I perceived what was missing and began to fill the gaps with practical experience by working for Seattle's Woodland Park Zoo. I learned about birds by preparing their food and cleaning their enclosures. I read everything I could find about birds, absorbing facts and experiences and eventually translating them visually.

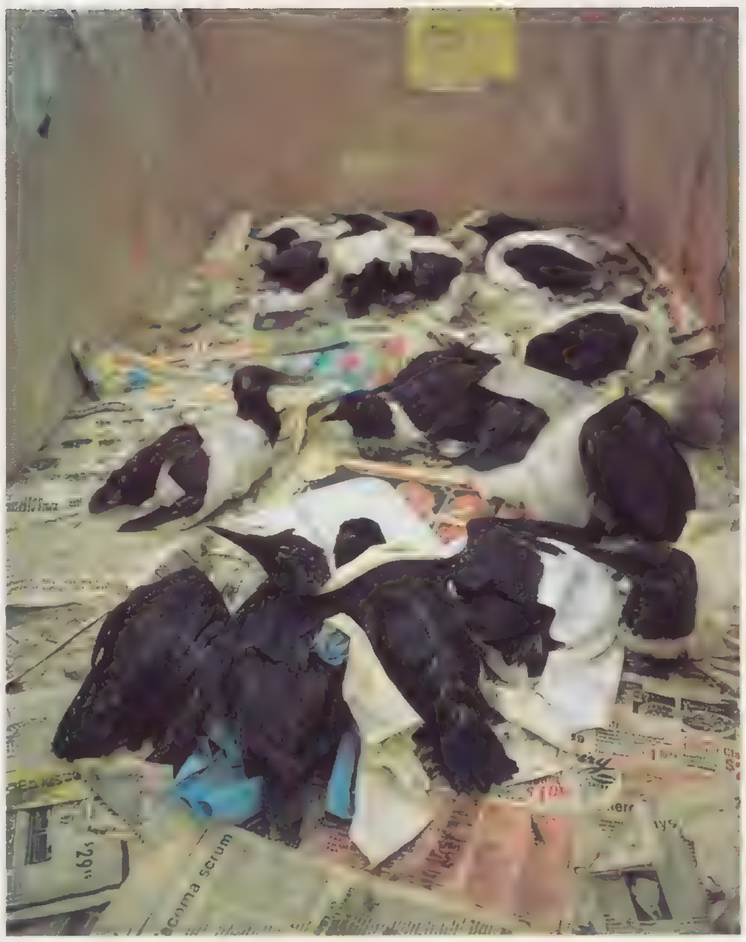
But it wasn't until I worked at an emergency oil spill clinic that I stopped observing animals at a distance. Surrounded by injured birds, I could not separate myself from their vulnerability. I was sickened by the oil on their feathers, evidence of human insensitivity to the environment. At the same time I was heartened by the humane concern of my fellow volunteers. Once state agencies or local wildlife rehabilitation experts set up a clinic, they keep it afloat by donated supplies and volunteer energy. Most volunteers hear about the accident on news broadcasts and decide to help for a few hours, days, or weeks. Many arrive without animal-handling skills, but all come with a commitment to learn and do whatever is necessary.

Looking back at three clinics, I recall different lessons from each. My first, in a gymnasium 30 miles north of Seattle, seemed like an adventure, a chance to practice what I had learned as a keeper's aide in the waterfowl unit at the zoo. Because I had relevant training, or thought I did, the coordinator asked me to force-feed a group of buffleheads and goldeneyes. They were small birds, I had small hands, so it seemed logical.

Logical, maybe, but immediately I realized how unprepared I was to pick up a wild creature. I reminded myself that no one, not even veterinarians or professional trainers, instinctively knows how to handle animals. These skills are learned. After several hesitant attempts, I grabbed a bufflehead, pryed open its beak, and pushed a dab of moistened food down its throat with my little finger. I worked to perfect my technique, trying to move quickly without hurting or further stressing the bewildered birds. To this day, I smile at the memory of my contact with dozens of tiny duck tongues.

In contrast to the pleasant memories of the first spill, my recollections of the most recent one are colored by desperation. Two days before Christmas 1988, a tugboat rammed a tanker near Gray's Harbor, southwest of Seattle. Oil spread to Oregon and British Columbia. Officials initially underestimated the gravity of the worst accident in Washington history and were reluctant to enlist aid. First asking for help from experienced volunteers only, the Washington Department of Ecology later acknowledged its gratitude to

GEORGE M. SANGRIK



"I knew the oil was deadly. Unwashed, the birds cannot fly, float, or stay warm. . . . And I knew that hundreds of common murres [right], pigeon guillemots, western grebes, and various scoters had sat in oil for nearly a week." Far right, preparing birds to be washed. Before the first rinse, they received antibiotic injections, salve on the eyes, and a beak swabbing to remove oil from the mouth.

less experienced people who traveled from as far as California and Canada to help.

By the time the first wave of volunteers arrived, three critical days had passed. Inadequate supplies of hot water at a temporary clinic hampered washing efforts. Some of the rarer birds, such as a rhinoceros auklet and a few loons, were washed immediately after recovery from the beach; but hundreds of common murres, pigeon guillemots, western grebes, and various scoters sat in oil for nearly a week. As the birds anxiously preened, they swallowed the toxic oil coating their feathers. Each day without a bath lessened their slim chances of survival.

I joined other volunteers in an attempt to keep the unwashed birds fed and hydrated until we could move to better facilities. Exhausted after my first day at the clinic, I checked into a motel, tried to rest, and awoke abruptly. I looked around the unfamiliar room and thought I saw shadows of murres and guillemots on the floor. They broke in dark waves against the bed, vanishing every time I reached out. I forced myself to go back to sleep, and then dreamed about a small white-winged scoter I had held during the day. Unlike the other birds, she was quiet. I stared at the soiled feathers on her back and sheltered her head with my hand. As I rocked her, her heartbeat weakened, and I repeated, "I'm sorry, I'm so sorry." For weeks afterward, I fought to rid myself of this nightmare and often awoke in tears.

Time has passed, the dreams have faded, but not the scars on my hands. These commemorate the feisty energy of the murres and my often unsuccessful attempts to catch them without getting caught first. Jousting with one after another, I learned to respect their tenacity. Other species wore out faster, but even weak birds could be just as formidable. During my final day at Gray's Harbor, I overheard a coordinator instructing new recruits in the art of handling western grebes. He believed the longer-necked, sharply beaked species to be the most dangerous and difficult species to control. "Just be grateful we don't have any cormorants," he concluded. "They're the worst."

I was glad to think about cormorants as I drove home that day, to reflect upon another emergency oil spill clinic and a very different experience I had shared with a cormorant.

Before dawn on Christmas 1985, I took a ferry from Seattle to the Olympic Peninsula and signed the volunteer roster at a gymnasium in Port Angeles, where a spill had just occurred. All morning I prepared birds to be washed. Before the first rinse, each bird received preliminary veterinary care: antibiotic injections, protective salve on its eyes, and a careful beak swabbing to remove residual oil from its mouth. Then the tedious scrubbing process began, with volunteers carrying birds back and forth from sudsy washtubs to the showers until every feather rinsed clean.

Volunteers at emergency spill clinics are generally divided into two groups: feeders who work with cleaned birds, and washers who are confined to the locker rooms. The people with the oiliest clothes work with the dirtiest birds and pass them on to cleaner volunteers as the washings progress. At Port Angeles, I started with dirty birds; by noon sticky oil had chewed holes through my rubberized overalls. Here was proof of the corrosive property of petrochemicals. While I could not see its long-term effect inside the birds at the clinic, I knew the oil on their feathers was deadly. Unwashed, these creatures were helpless; they could not fly, float, or stay warm.

I, at least, could take off my useless overalls. Once I had peeled to a cleaner layer, the washroom coordinator handed me a double-crested cormorant that had been washed and generally de-oiled. My task was specific: to clean each feather on its head with a Water Pik. For hours I sat on a folding chair with the bird balanced between my legs and the Pik humming on a table next to us. With one hand, I supported the cormorant's neck. With the other, I focused the water and combed across the feathers in short, methodical strokes.

I began the process cautiously, watching the bird while it noted my every move. Earlier, a veterinary technician had closed its sharp beak with tape so the bird could not bite or spear its handlers. But when my charge began to blow bubbles through its elongated nostrils, I removed the band. The cormorant instantly relaxed and seemed more curious than dangerous.

At once, I realized that this was an extraordinary opportunity. I had handled captive birds at the zoo and wild ones at other clinics, but I had never examined one so closely. I had relied on mounted specimens and photographs for details. I had filled my head with

BRETT BAUNTON (2)

Human hands prevent a bite from a red-faced cormorant, wash a Barrow's goldeneye, and dry a pigeon guillemot. "None of us could reverse the damage, but by working on the most elemental level, I could make amends with a single bird."

MICHAEL BAYTOFF (3)

facts, and could, for example, recite the range of avian body temperature. But until that day, the figures had remained abstract. As I sensed the cormorant's damp heat radiating through my clothes, I experienced warm-bloodedness in a new way. The bird and I exchanged body heat everywhere we touched. I could feel impressions of webbed feet on my legs and feather marks along the inside of my arms.

Unlike others around us, this bird appeared healthy and unafraid. As it looked around the room, the cormorant seemed to watch the day unfold as a spectacle rather than a trauma. It was calm and seemed willing to cooperate, which enabled me to consider every feather tract I cleaned. The more I contemplated the depth of its blackness, the more detail I perceived. Points of turquoise outlined pale green eyes. Burnt-orange skin marked the bird's throat in colorful, featherless contrast. Against my skin, its snaky neck and armored feet felt reptilian. I could even feel its small, flexible gular pouch.

As the afternoon unfolded, the bird became my sole focus. Earlier in the day, I had yielded to every distraction — watching other people, even checking the clock. But as I worked with the cormorant, I became oblivious to the hectic activity around us. I shut out the noise so I could concentrate on my task, and soon it seemed as if the bird and I were the only beings in the room. Outside, a few miles down the beach, state ecologists surveyed the oil slick and assessed its impact on a large population of overwintering birds. None of us could reverse the damage, but I knew that by working on the problem at its most elemental level, I had found a way to make amends with a single bird.

I first understood my natural affinity for animals as a child, and at an early age I promised to work on their behalf. But my role as defender was much clearer before I reached adulthood, before I was invested in a web of technology. At one time, I could not imagine doing anything to harm another creature. Now, as I try to minimize my own negative impact on the environment, I often feel defeated by the complexity of our times. It is a comfort to remember the clarity and conviction of my childhood pledge.

My experience in Port Angeles reminded me of my earliest attachment to animals. For five hours I had enjoyed the company of another creature and now I almost regretted ending our time together. Reluctantly, I finished the task and lowered the cormorant into a pool with other birds. This was the final test; if it could float, its feathers were oil-free. Success. The bird swam off and the washroom volunteers cheered. The cormorant looked strong, and after it regained energy and natural oils, other volunteers would release it on a clean shoreline miles from where it had been found.

But release was weeks away, and as I watched the bird, I realized I would never know what happened to it. The mortality rate of animals rescued from an oil spill is depressingly high. Even if they outlive capture and cleaning, many later succumb to lethal doses of ingested oil. And of those released, few remain capable of reproduction. I knew the statistics, but I did not dwell on them when I left the clinic. I still like to think that the cormorant is alive, a survivor. If a bird can be said to express a will to live, this one seemed to do so.

It is the hope of saving even a few animals that motivates volunteers at an oil spill clinic. Confronted by death, we work hard to preserve life. We do what we can and in the process are changed. Like other volunteers, I have returned home with a stronger commitment to conservation and a new appreciation of life. In the end, I realize my efforts with the birds have helped me more than I can ever hope to help the birds. ☐

Constance Perenyi is a writer and artist living in Seattle.

Cornell Laboratory of Ornithology

Annual Report 1988/89

A SPECIAL LIFE LIST

Bird watchers like to make lists. You probably keep some yourself—lists of birds you've seen in your yard, or on trips, or throughout your life. Staffers here at the Lab of Ornithology are particularly fanatic. Many of us keep year lists and seasonal lists, even lists of birds we see from our office windows.

But there's one list kept here at the Lab that surpasses all others. Larger than any life list, it's not even a bird list. It's a list of people—the 14,000 Lab members and friends who give time and funds to support the Lab and the thousands of people who contribute bird observations to our databanks every year.

On the following pages we present a roster of individuals, corporations, and foundations who have made special gifts during the past year. First, though, we'd like to note that bird watchers don't just keep lists, they also enjoy learning more about the birds *on* their lists, especially unusual ones. Therefore we describe here the key field marks of four individuals representing a cross-section of Lab members—the people who supply the funds, expertise, or enthusiasm that keep us growing.

Board member **Robert Nagler** introduced himself to the Lab about two years ago when he appeared in our observatory with a brown paper bag under one arm. People on lunch break don't normally wander into our building, so we suspected that Bob must have something special in the bag. He did. It was a fine carving of an American goldeneye which he had just acquired from a local woodcarver and wanted to show to us. We immediately struck up a conversation about Bob's interest in birds.

Bob turned out to be a Cornell graduate who had studied with Arthur A. Allen, co-founder of the Lab. Bob's interest in birds had been shelved during a productive career in business, but since retiring, he had started to renew his birding connection. Within a year we had signed him onto our administrative board, where he is now very active. During the past year he spearheaded the formation of our Chairman's Council, a special group of Lab members who lend guidance and substantial financial support. In its first year the Council attracted 23 members thanks to Bob's leadership, hard work, and contagious enthusiasm.

Enthusiasm isn't confined to our newest board members. **Charles Treman,** a retired bank president, has helped shape every aspect of the Lab's operations since it moved to its present quarters in 1957. One of only three people who have been appointed board member for life, he is well respected for his sound advice on financial management and administration. With energy and dogged determination he has helped tackle some of the Lab's thorniest issues. Nor does Charlie mind getting his hands dirty. Chairman of our buildings and properties committee, he has a particularly keen eye for aesthetics and spends as much time working on the Lab's grounds as he does sitting at the conference table negotiating Lab business.

Board members are not our only staunch allies, of course. One of our longest-standing supporters is **Dorothy McIlroy,** a resident of Ithaca who first appeared on the Lab's doorstep in 1938 as a participant in Professor Allen's summer bird-study course. When the Lab became a membership organization in 1964 Dorothy was one of the first to sign up, and she has renewed her membership every year since.

But Dorothy contributes far more than an annual membership fee. She is also an energetic volunteer who furnishes a great deal to our knowledge of local birds. She has led more local birding trips and study groups than anyone can count, coordinated local Breeding Bird Atlas efforts, and participated in numerous Breeding Bird Surveys. Until very recently, she maintained all nest records for birds in the Ithaca area as well as the Lab's master list of all birds found annually in our region. In short, Dorothy has contributed to every aspect of local ornithology.

Our supporters don't have to live in Ithaca to make important volunteer contributions to ornithology. Consider **Victoria Willow** of Garfield Heights, Ohio. She first learned about the Lab two years ago when she opened a copy of *Bird Watcher's Digest* and read about Project FeederWatch, our continentwide survey of bird populations at feeders. She and her husband, Joseph, "dine with the birds every morning," so sending her observations to FeederWatch was a natural extension of her love of bird watching. Since joining the project, Victoria's interest in birds has increased—she watches her birds more intently than ever and reports, happily, that she has mastered the computer data forms. So far, her most memorable observation has been the simultaneous appearance at her feeder of three species of woodpecker—hairy, downy, and red-bellied.

The Lab benefits from Victoria's participation in two important ways. First, her observations are invaluable as part of our bird population databases. Second, her enthusiasm for birds spreads word of the Lab's work in education and conservation to her family and friends.

We thank these folks and every one of our members for your steadfast support. Our membership is extremely loyal, a fact we don't take for granted. Without you we don't exist!

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YEAR END FINANCIAL REPORT

Fiscal year 1988–89 was a good one. Our base of support broadened substantially with the addition of new funding from Corporate Associates, FeederWatch Sponsors, the Chairman's Council, and the Crow's Nest Birding Shop. Also, the Lab's continually growing membership increased its support through annual dues, special gifts, our annual year-end appeal, and Big BirdWatch. The favorable figures presented here epitomize our supporters' commitment to birds and the Lab.

INCOME	*July 1, 1987– June 30, 1988*	*July 1, 1988– June 30, 1989*
Membership	$ 440,896	$ 481,729
Gifts	182,747	201,456
Investments	11,594	11,456
Cornell University Subsidy	98,208	63,126
Crow's Nest Bookshop: income after expenses	3,096	32,140
Library of Natural Sounds	216,644	142,795
Seatuck Research Program	224,356	189,901
Bird Population Studies	213,803	219,508
Bird Navigation Research	76,968	96,826
Education and Information Services	170,759	132,182
Bioacoustics	331,620	129,040
Miscellaneous	94,915	254,248
TOTAL	2,065,606	1,954,407
EXPENSES		
Library of Natural Sounds	328,546	227,178
Bird Navigation Research	76,968	96,826
Seatuck Research Program	224,356	189,901
Bird Population Studies	239,406	269,030
Education and Information Services	203,142	138,359
Publications	238,049	273,000
Development and Membership Services	362,216	235,890
Operations	296,205	275,836
Bioacoustics	142,100	129,040
Miscellaneous	94,915	117,246
TOTAL	2,205,903	1,952,306
Excess (deficit)	(140,297)	2,101

SHOULD WE FEED BIRDS IN WINTER?

Margaret Clark Brittingham

A chickadee cracking open a seed, a brilliant red cardinal on a bleak winter day, the raucous calls of a blue jay — these are some of the sights and sounds at backyard bird feeders. For decades people have provided food for birds in return for this display of sound and color. We certainly benefit from bird feeding, but do birds?

Throughout my childhood, my family fed birds, and as an adult I continue this practice. Like many people, I had assumed that bird feeding is beneficial to birds, or at least not harmful to them. Looking through the many books and articles on the subject, however, I realized there is plenty of information on what and how to feed, but not on how feeding affects birds. I was surprised that a practice so widespread — over 82 million people in the United States dispensing over 1 billion pounds of bird seed annually — had not been scientifically evaluated.

I got the opportunity to test whether or not bird feeding was good for birds while I was a graduate student in the department of wildlife ecology at the University of Wisconsin, Madison. My advisor, Stanley Temple, an ornithologist and habitual bird feeder, had contemplated the same question. Together we planned a three-year study to measure the effect of bird feeding on a bird's ability to survive the winter.

At first the answer seemed obvious. Of course birds with access to feeders are more likely to survive the winter — that's one of the reasons we feed birds. But after giving the question more thought, I realized the answer might not be so simple. The flocks of birds that gather at feeders often attract such predators as cats and hawks. The risk of disease might also be higher at feeders where large numbers of birds gather to feed in a small area. And perhaps birds that use feeders become so dependent on these handouts that they can't find sufficient food when feeders are not available. I began to wonder if the risks outweighed the benefits.

Stan and I decided the best way to measure the effects of bird feeding was to compare groups of birds that use feeders with groups that depend totally on the natural food supply. This seemed like a reasonable plan back in the lab, but because feeding birds is so popular in south-central Wisconsin, finding remote areas where no bird feeders were present turned out to be a real challenge. We eventually discovered two satisfactory sites in the Baraboo Hills of Sauk County, Wisconsin, in remote wooded areas where human habitation was limited to an occasional cabin. In addition to these nonfeeder sites, we chose three more in similar rural habitats where we set up centrally located feeding stations.

I originally planned to study about 15 different species, color-banding the birds and monitoring them through the winter. For this type of study, I needed species that remained in the same local area throughout the winter, were abundant, and could easily be captured and observed. I also wanted species that were frequent visitors at feeders. Nuthatches were excluded from the study because they were too difficult to capture on the nonfeeder sites. Juncos and goldfinches were also ruled out because they arrived on the sites in large flocks, stayed for a day or two, and then departed.

So, after finding problems with virtually every potential subject, I finally settled on a single species. The black-capped chickadee, one of the most frequently observed species at North American feeders, had all the characteristics we were looking for and more. It is one of the smallest species to winter in northern areas and has such high energy demands that it must feed almost continuously to survive during the winter. A chickadee in the wild eats insect eggs and larvae, berries, and seeds. Because the bird needs so much food to survive, we would expect it to benefit from supplemental feeding, if any species actually does.

We decided to mark each chickadee with one aluminum and tricolored leg bands so we could tell how frequently individual birds visited the feeder and, as the winter progressed, which ones were still alive on all the sites. We set up mist nets to catch birds and over the course of the study banded 576 chickadees. With the help of the tricolored bands, we were able to

LEONARD LEE RUE III

A chickadee snatches a single sunflower seed. Does winter feeding help the tiny birds survive — or turn them into dependent beggars?

identify individuals in the woods or at the feeders.

Once we had color-banded the birds, the hard part of the study began. We had to locate, identify, and follow as many chickadees as possible. Two full-time field assistants, Scott Hereford and Sherrie Gruder-Adams, and numerous volunteers helped in this endeavor. We went to each site at least once a week and spent the day hiking around the study area looking for banded chickadees. Deciphering colorbands on a chickadee foraging in the top of a tree in the middle of a Wisconsin winter is an undervalued skill. Successful observers were tolerant of the cold, patient, not colorblind, and could distinguish between right and left legs and top and bottom when a chickadee was hanging upside down at the top of a tree.

Chickadees eat almost nonstop during the winter, stoking the metabolic furnace with insects, berries, and seeds. Bottom right, a chickadee pecked open this goldenrod gall to get at the insect larvae sheltered inside. Top right, scientist and subject. Margaret Brittingham concludes that chickadees which supplement a natural diet with extra calories from feeder foods are more likely to survive very cold temperatures.

In addition to the weekly checks we conducted all-day feeder watches to determine what percentage of the birds' energy requirements were obtained from the sunflower seed we supplied. Since chickadees take one seed at a time, by watching a feeder all day we could count the total number of seeds each banded bird ate. Sunflower seeds are high in calories, but even on a mild winter day, a chickadee would have to eat over 150 seeds to satisfy its daily energy requirements. At zero degrees Fahrenheit it would have to eat over 250 seeds, approximately 60 percent of its body weight. We knew that captive chickadees could survive on a diet of just sunflower seeds, but whether chickadees would choose to do this in the wild was another question. In fact the data from our all-day feeder watches showed that most chickadees were obtaining less than 25 percent of their food from the feeder, using seeds merely as a supplement to their otherwise natural diet.

Although the chickadees were using the feeder only as a supplement, we wondered whether the seeds helped them survive the winter. Since chickadees remain in the same area throughout the winter, and breed near these home ranges in spring, we assumed the banded birds that disappeared over the winter had died. In the spring we looked at our weekly counts and compared banded chickadees' survival on feeder sites to those on nonfeeder sites. We found that chickadees at feeder sites did have a better chance of surviving winter than nonfeeder birds: 69 percent of the birds that were using feeders were still alive the following spring, while only 37 percent lived through the winter without access to feeders.

We found that feeder chickadees benefited most from the extra calories during periods of very cold temperatures. During months when the temperature fell below zero on more than five days, approximately 93 percent of the feeder birds survived, compared to 67 percent of nonfeeder individuals. During winter months with more moderate temperatures, supplemental feeding had only a slight effect: 96 percent of the feeder birds and 92 percent of the nonfeeder birds survived. We concluded that feeders had a relatively small effect on survival in most months since 18 of the 21 winter months of our study had moderate weather conditions.

While our results show that chickadees weather extreme cold better with the help of feeders, the warmer months of early spring may be another time when extra food is important. Anyone who feeds birds has been admonished to keep filling the feeder in early spring when the natural food supply is least abundant.

To learn the relative importance of feeders to bird survival in winter and spring, we compared monthly survival rates between fed and nonfed birds in early and late winter. Our results suggest that feeders have about the same effect on chickadee survival late in winter, when the natural food supply is least abundant, as early in winter when food is plentiful.

Having demonstrated some benefits of feeding, we decided to examine the risks. Many people are concerned that birds using feeders get hooked on this food source and become unable to survive without handouts. So, during the final year of our study, we tested whether hard-core feeder users could survive going cold turkey. At one of our study sites, Devil's Lake State Park, the park naturalists had been feeding birds for 25 years. If any population of birds was dependent on feeders, this should have been the one.

We decided the ideal way to test whether these birds were feeder addicts was to remove the feeders and compare the populations' survival rate to that of nonfeeder chickadees. Convincing Ken Lange, the current park naturalist, that this was a good idea wasn't easy. I tried to appeal to his scientific side, telling him our results would help answer questions people had pondered for decades. He eventually gave in, but only after I promised him a year's supply of bird seed.

We removed the feeder, thereby forcing the local birds to forage for natural food. When we compared the park chickadees' average monthly survival rate to that of a group of nonfeeder birds, we found both groups did equally well: 84 percent versus 85 percent survival, respectively. These results suggest that feeder dependency is not a problem, and are in keeping with our earlier findings that chickadees use feeders to supplement a mostly natural diet.

But what about another potential risk of bird feeding — the spread of disease as birds congregate at an easily contaminated food source? Each year birds are found dead at feeders. Last winter, for example, an outbreak of "songbird fever," a disease caused by the bacteria *Salmonella*, struck many northeastern states. Just how many birds die from diseases contracted at feeders?

To get an estimate, we left the woods and the chickadees to contact people who feed birds. We sent a questionnaire to 1,000 members of the Wisconsin Society for Ornithology, asking them what birds came to their feeders, what types of feeders they used, and whether they had found birds dead from disease near their feeders. Respondents reported diseased birds at about one out of 20 feeder sites. So, while the probability of disease at any particular site is low, in areas where the density of feeders is high, the probability of disease is also high.

Although these statistics are interesting, they don't tell the whole story. Problems with disease do not occur randomly. The Wisconsin birders reported sick birds at sites where large numbers of highly gregarious species such as house sparrows, goldfinches, and juncos gathered, and at sites where platform feeders that allow birds to stand on top of the seed were used. These findings don't mean you must throw out your platform feeder, but you should clean accumulated droppings off the feeder weekly and put out only a one-day supply of seeds.

STEVEN D. FACCIO (2)

MICHAEL MOSSMAN

Our research showed that chickadees do profit sometimes from feeders. Still, I think bird feeding probably has less impact on birds than is popularly assumed. Greater benefits of feeding go to people. As our society becomes more urbanized, feeding and observing birds fulfills our need to have contact with the natural world.

Our research ended in the spring of 1985. Since that time, I have missed the days walking through the woods searching for chickadees. My heart still jumps when I hear the familiar *chick-a-dee-dee-dee*; it makes me nervous to see a chickadee without bands on its legs. But things are looking up. Last October I took out the mist nets and bands. I'm starting a study in Pennsylvania that will focus on the effects of feeding on the tufted titmouse and white-breasted nuthatch as well as the chickadee. I hope to determine whether feeding has similar effects on these different species. I'll also compare the effects of feeding on chickadees in Wisconsin with those in Pennsylvania, where the winters are much milder. ☐

Margaret Brittingham is an assistant professor of wildlife resources at Pennsylvania State University, where she is continuing her research on the effects of bird feeding on wild birds.

Further Reading

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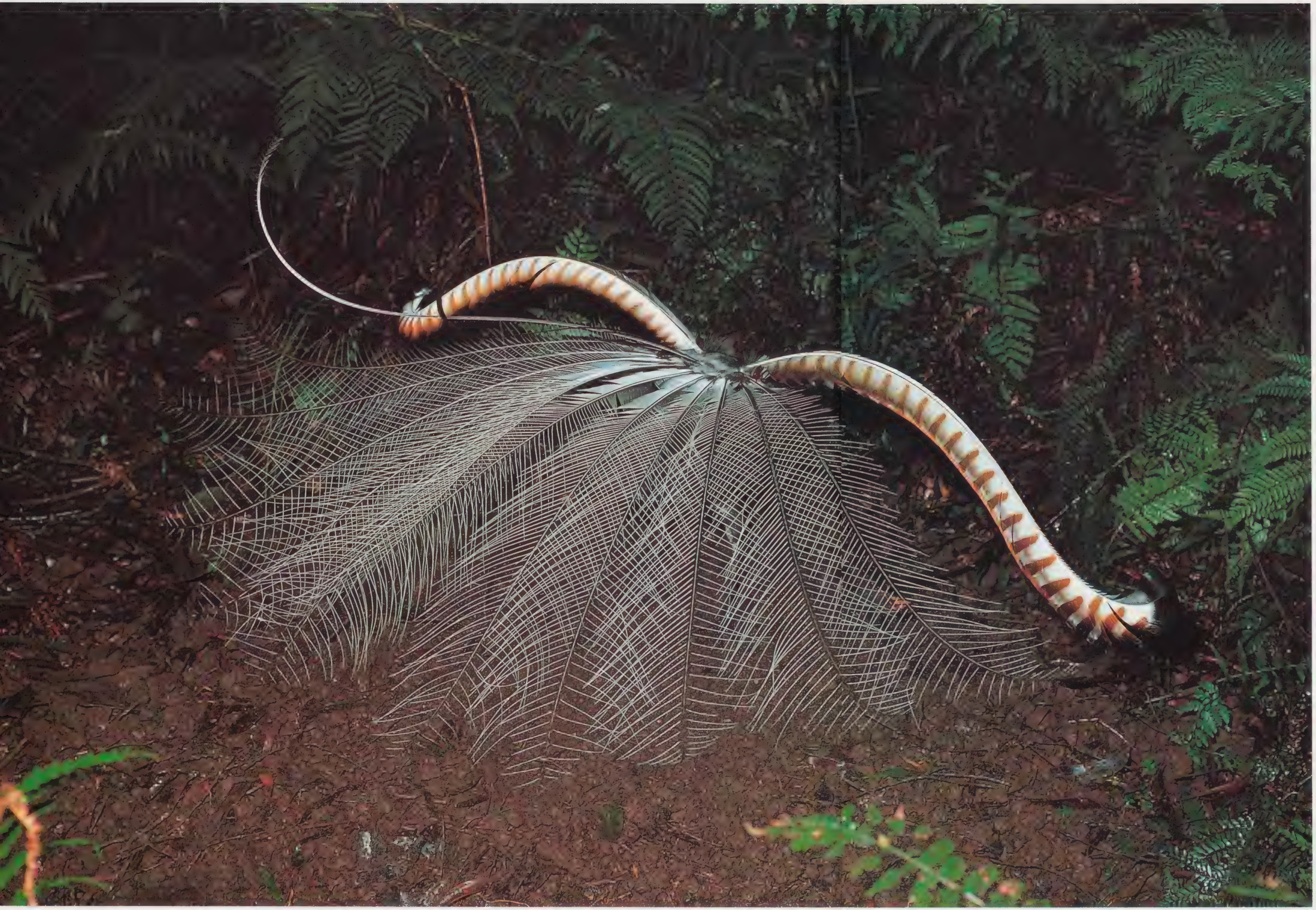
HANS & JUDY BESTE (AUSCAPE INTERNATIONAL) (2)



Of Australia's 700 bird species, half are found nowhere else. One such species is the superb lyrebird, known for its stunning courtship display. The male possesses a tail three feet long and shaped like a lyre, which transforms an otherwise drab brown bird into a superb one. Lyrebirds can also mimic the calls of other birds, animals, chainsaws, and car horns.

EXCEPT IN AUSTRALIA

Barbara Sleeper and Michael Hutchins

To enter a tropical rainforest in northeastern Queensland is to enter another world. It's a vegetative explosion—a thousand shades of green. Trees with nine-foot-wide trunks intertwine their canopies more than a hundred feet overhead. Many have huge buttress roots fanning out from their bases. Others sprout flowers and clusters of fruit right from their trunks. Ferns, mosses, and orchids blanket the branches, and lianas, the classic Tarzan vines, ascend to the treetops. On the shaded forest floor, ants file through the undergrowth; red, yellow, and white fungi sprout from the rotting vegetation. The air pulsates with the calls of insects, and with the songs and cries of some of the world's most dramatic and unusual birds.

Of the 700 bird species found in Australia, almost half breed nowhere else. And although the rainforests cover only a fraction of the continent's land mass—an area the size of Massachusetts in a continent nearly the size of the United States— they are home to at least 140 bird species, a fifth of the total.

That Australia has any rainforest birds might be a surprise—many of us think of that country as an arid land suitable for sheep, kangaroos, and other animals that don't need a lush environment to survive. But Australia was once almost entirely covered with rainforest; today's small patches are merely the remnants of a vast, uninterrupted forest that rivaled today's

JOHN CANCALOSI

Above, the emu, a ratite related to the ostrich, is Australia's national bird. Right, mallee fowl, and near right, brush turkey belong to a group of birds called "megapodes" (big feet), the only known bird species that do not use their body heat to incubate their eggs. Each fall the male digs a deep hole and fills it with heat-creating compost. He then covers the fermenting center with a mound of sand. Over the next few months his mate may lay some 30 eggs in it. The male measures the incubating eggs' temperature by taking a beakful of compost. If it is more than 90 degrees Fahrenheit, he opens the mound to let heat escape; if less, he may open the mound to let the sun warm the eggs. Meanwhile, instead of incubating, the female can be producing eggs.

Amazon basin. To understand the origins and unique inhabitants of Australia's forests entails looking deep into the region's geological history.

Two hundred million years ago, the southern hemisphere contained one massive supercontinent, Gondwanaland. It comprised today's Australia, Antarctica, Africa, India, and South America. The northern hemisphere had its own supercontinent, Laurasia, which was made up of present-day North America, Europe, and Asia.

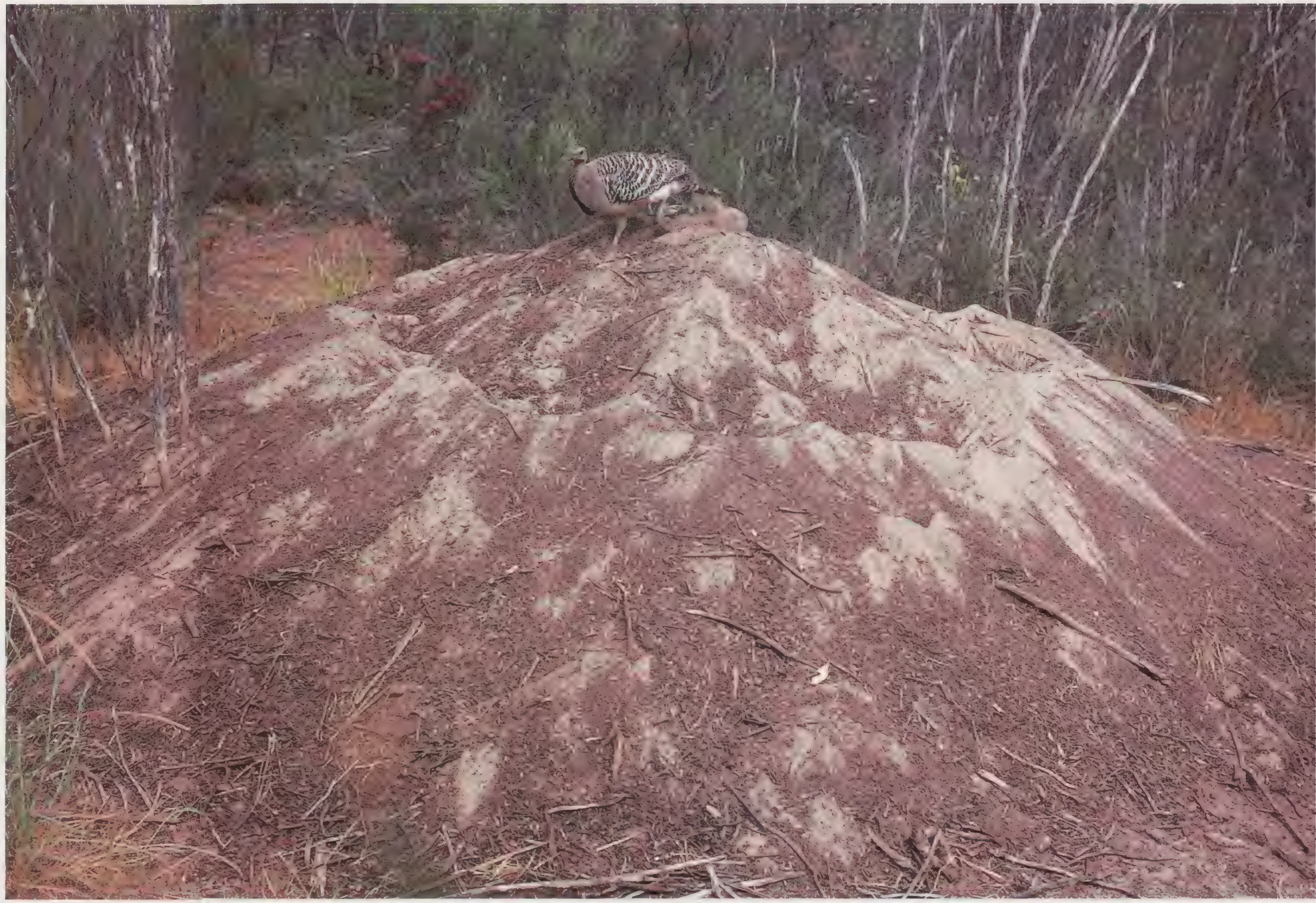
By about 45 million years ago, forces deep within the Earth had caused Gondwanaland to break apart, and some of the resultant continents—Africa, India, and South America—had drifted north and bumped into Laurasia. Once these pieces of Gondwanaland joined Laurasia, the plants and animals mixed freely, and many "pure" Gondwanaland species were lost.

Except in Antarctica and Australia. The latter, along with New Guinea, rafted slightly northward into warmer latitudes, carrying a complete array of primitive Gondwanaland species. Until relatively recently, the continent was subject to little colonization from the north, and its species flourished and diversified as they pursued their own course of evolution.

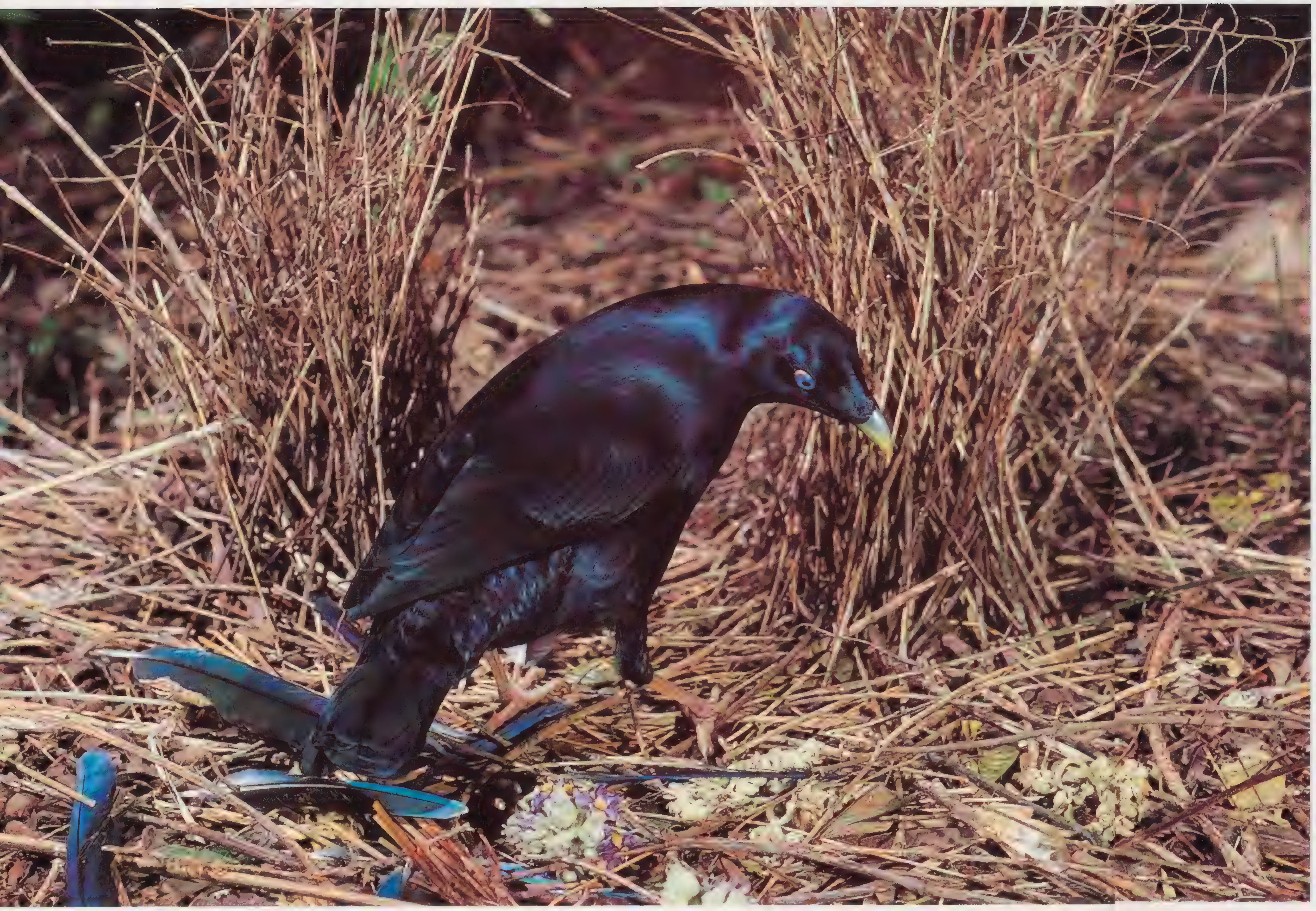
Australia's flora and fauna faced a different threat, however. As the ages passed the continent went through six to eight periods of cooling and drought interspersed with warmer, wetter periods. As the climate fluctuated, so did the extent of the great rainforests. During harsher periods, mass extinctions of rainforest species occurred throughout the continent, except in a narrow band of low mountains along the east coast. The mountains were struck by water-laden ocean winds, which were forced up to higher altitudes; there the winds dropped their water as rain. In the damp, sheltered valleys Gondwanaland species found refuge, some surviving almost unchanged to this day. Among the birds thought to have Gondwanian origins are ratites such as the cassowaries and emus and the mound builders, including the brush turkey.

Today, the Australian rainforests stretch in a broken chain from the northeast to the southeast corners of the continent, a distance of about 2,600 miles. Because they cover a broad range of latitudes, Australia's rainforests come in many different forms. In the extreme northeast are the lowland rainforests that support the highly endangered palm cockatoo, magnificent riflebird, and red-cheeked parrot. The wet tropical forests of northeastern Queensland, believed to be among the oldest rainforests on Earth, support a variety of unusual birds, including the wompoo pigeon, buff-breasted paradise kingfisher, and southern cassowary. The nearby highlands are home to the fern

JOHN CANCALOSI (2)



STANLEY BREEDEN



JOHN CANCALOSI (2)

wren and golden bowerbird. Lyrebirds, rufous scrub-birds, and double-eyed fig parrots can be found in the temperate rainforests of southeastern Australia and Tasmania.

Worldwide, the primordial rainforests—the world's richest terrestrial habitats, the culmination of millions of years of evolution—are being destroyed at the rate of about 96,500 square miles per year. At that rate, the most complex and least understood of global ecosystems will be gone within the next half-century.

Australia is no exception. It has lost three-quarters of its rainforests since Europeans arrived 200 years ago. What remains is rarely in pristine condition, existing as part of a patchwork of agricultural fields, roads, airstrips, and logging, mining, and real estate enterprises. Typically, the areas conservationists most want to save are those being logged because, in addition to their wealth of plants and animals, they contain the highest proportions of commercially valuable trees.

A month-long demonstration in 1979 against logging at Terania Creek in northern New South Wales marked the birth of Australia's rainforest conservation efforts. Since then environmentalists with such organizations as the Australian Wilderness Society, the Australian Conservation Foundation, and the Rainforest Conservation Society of Queensland have been fighting to save the remainder of the forests.

Conservation organizations lost an important battle in 1984 when a 21-mile road was cut through the center of one of Australia's largest undisturbed patches of virgin rainforest in the Daintree wilderness. In a last-ditch effort to stop the road building, a dozen protesters, chained to blocks of cement, buried themselves up to their necks in the bulldozer's path, but they were eventually dug out and arrested by police. The road has allowed intrusion of alien plants and animals, and has increased access for real estate development, logging, and tourism. The road has also had broader consequences — the more than 175 inches of normal wet-season rain have washed out the dirt road each year, depositing tons of silt on nearby coral reefs; scientists now fear that the silt, along with other problems, eventually will prove fatal to the Great Barrier Reef.

The conservation status of many Australian rainforest birds is poorly understood, but few species have been listed as endangered. This is no excuse for complacency, however — the many species that are completely dependent on the fragile forest habitat are very vulnerable. That they exist at all is remarkable. Rainforests are extremely complex and stable environments in which a great diversity of specialized species has evolved over millions of years. In Australia, they are home to ancient species that exist only because they found safe refuge from severe climatic changes. It would be ironic indeed to lose them now to the chainsaw and the bulldozer. □

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Further Reading

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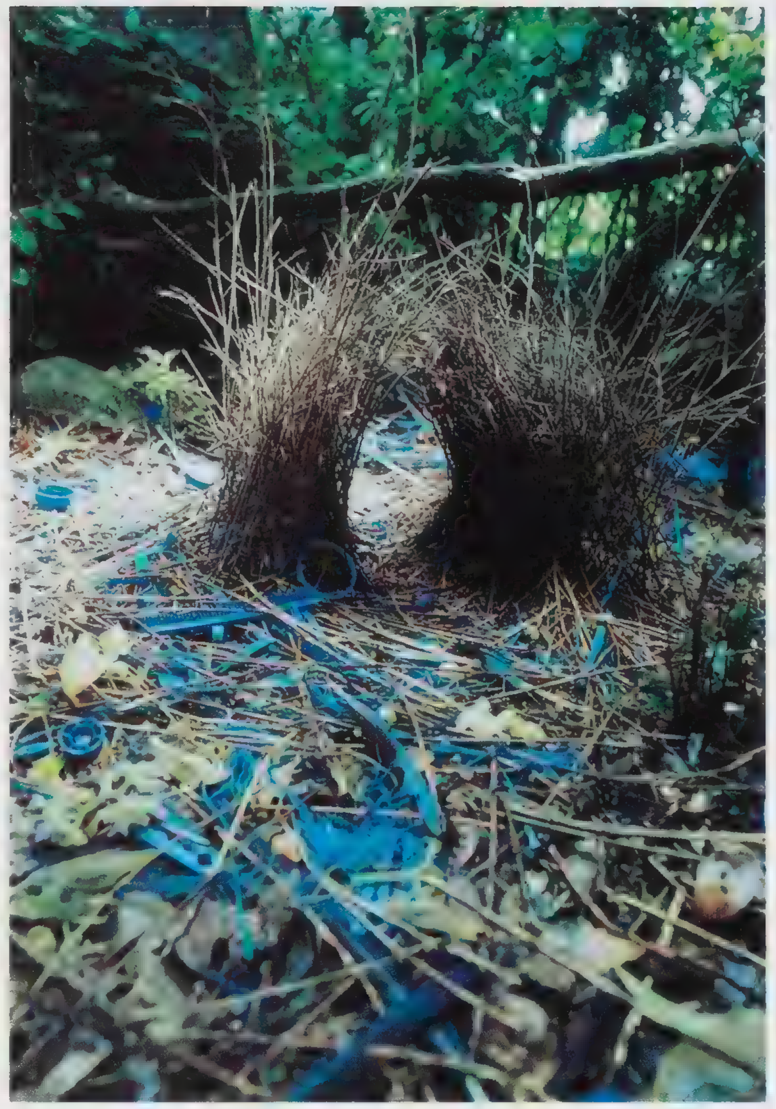

MICHAEL HUTCHINS

The satin bowerbird, top left, also has unusual breeding behavior. Its name derives from the males' habit of building elaborate bowers, above, to attract females. In addition, the male seems to be fixated on the color blue. During mating season he decorates his bower with blue flowers, feathers, clothespins, bits of glass and plastic, and candy wrappers. When courting, he prances and struts around his bower, occasionally offering a blue object to the female. Bottom left, pied currawong, a bold, omnivorous, crowlike bird with a loud, guttural call.

BHL

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BITTERNESS AND SWEETNESS

I was threading my way through a primeval forest by a river in a remote district of Gansu province on a summer day in 1988 when a fish suddenly dropped from the sky and bounced and flopped on the ground. What a strange thing! I looked up at once and stared with astonishment as a plume spun down like a silver top, landed upright, and inserted itself in the grass — a resplendent white flower.

At that moment I heard a hubbub of voices as 10 men approached me from the woods. By the flying swan pattern and the words "Niao Mi" (bird watching enthusiast) on their badges, I knew they were a team of birders who worked at an electronics factory in Sichuan Province.

"This is the best region to watch egrets," said team leader Mr. Feng Xiao. "So many nests are in the treetops, so many flocks of egrets crying *oh-oh-oh* continuously."

The fish, of course, was caught and brought here by the mother egret. The hatchling egrets in the tree above me had not opened their eyes yet, and in begging food from their mother or in trying to snatch it from one another, had dropped the fish.

At right, two quail. For 2,000 years Asian artists have been inspired by a closeness with nature. To the Chinese, many plants and animals carry a symbolic meaning. Chinese characters, at far right mean niao mis, *bird watchers. In China, painting is an extension of handwriting, the brush creating rhythmic, flowing movements.*

Courtesy Chester Beatty Library and Gallery of Oriental Art, Dublin

That night the bird watchers and I put up at the same hunting lodge. Mr. Feng said straightforwardly, "In the early 1980s, few people in China were interested in birds except children and retired workers, but now there are many *niao mis* just like us. Because our wages are low, on the average about $40 a month, we scrimp on food and clothes so that we may travel to some region to watch birds. Our one trip a year may last from 15 to 30 days. We never take a sleeping carriage, and we usually stay in a cook-feather inn (a very small and cheap hotel in the villages of China) for the night, sometimes even a temple. But more and more people envy our lives in the wilderness, the verdant woods, fresh air, and hundreds of birds singing — turtledove, oriole, myna, egret, golden pheasant, tit, and woodpecker. We live in a world of dreams. Our condition is simple and crude — one secondhand hunting rifle, one inexpensive camera without a long zoom, and three pairs of binoculars, but we have plenty of pencils, and a few of us are skilled at sketching."

Mr. Feng showed me some rough sketches of a golden pheasant and large egret. I was deeply touched by their spirit.

He continued. "All of us know a bit about ornithology, and we have some books — *The Handbook of Knowledge to Love Birds* by Zehn Guang-mei, *The Collection of Illustrative Plates About Chinese Birds, The Distributional List of Chinese Birds* by Zehn Zhou-xin, and *The Birds of China* by Rodolphe Meyer De Schauensee, but most of these are not suitable for amateur bird watching in China."

Then several of the other fellows chirped in with some fresh insights into their hobby — adding that it was full of bitterness and danger.

It seems that they had visited a reserve in Fujian Province in May 1986, and were charmed by the fork-tailed sunbird, which is as small as a thumb. When it flew among the thickly growing flowers to suck the nectar, it seemed a marvelous helicopter hanging in the sky; its body was golden green, its chest red. It was fantastically good. Mr. Liu, a member of the team, was giving his mind wholly to taking some photos of the bird so he didn't notice that a green bamboo snake had suddenly rushed at his left foot. Mr. Feng and his

OF *NIAO MIS* IN CHINA

Zhang Zhi-yen

Chanting Verses of Wang Wei

THE SONG-OF-BIRDS STREAM

Idly I watch the cassia petals gently fall.
How still the night! Blue mountains loom
stark and lonely.
The low-hung moon grows brilliant, startling
the wild birds
To doleful cries echoing through the dark valley.

EGRET DYKE

Swoop! The egret dives into the red lotus
blossoms.
Splash! He breaks the clear water into waves.
How handsome he looks in his new-born
feathered silk
Proudly balanced on the old raft, a fish in his
beak . . . .

THE RAPIDS BY THE LUANS'

Howl howl autumn wind rain
Fast fast stream over smooth rocks
Waves leap and crash together
White egrets startled then down again.

companions at once cut the bite with a razor blade and squeezed the venom from the wound. One of the forest guards showed the team the path to a strange flower, *Qiyeyizhihua,* seven leaves, one flower — a famous traditional Chinese antitoxic herb. At last, Mr. Liu was out of danger. For pictures of a rare and beautiful bird the watcher paid a great price.

But they also had a very wonderful trip, fit for a supernatural being, when, in September 1987, they got to Swan Lake in the Bayinbuluk grasslands in Xinjiang Uygur Autonomous Region. Along with two young Uygur men they whipped their horses to speed on together, wind whistling, the grasslands just like green brocade flowing quickly under them. With its many rivers, lakes, swamps, and springs the region is good habitat not only for swans, but for about 70 other species of birds, including 20 species of swimming birds, 24 waders, and birds of prey.

The bird watchers arrived at the lake when many birds are very prosperous; all species of migratory birds had finished breeding and were changing their feathers. Some were teaching their offspring to swim, dive, look for food, and learn to fly. With binoculars the bird watchers saw black storks and gray cranes walking slowly on the grasslands, brown-headed gulls and bar-headed geese flying over the lakes, green-headed ducks, spot-billed ducks, and tufted ducks swimming, cormorants and great egrets standing near the river shore, cinereous vultures flying, and songbirds singing everywhere.

But the swans were the most outstanding. There are five species of swans in the world, and Bayinbuluk records three — mute swan, whooper swan, and whistling swan. About 8,000 gather in Swan Lake each year. The largest flock the bird-watching team saw on this trip had over 900 birds, so that when they flew over, they nearly shut out the sunlight, and when they fell to the grasslands it seemed to be covered with snow. Mr. Feng and his friends saw mute swans floating in the water, often carrying their long necks in a graceful S-shape; and whooper swans wandering about the lakes, arrogantly stretching their long necks and washing and combing their wings on the shore. Their white feathers, easy carriage, and leisurely stroll added the idyllic to nature.

The *niao mis* could not help chanting some beautiful verses about swans by famous Tang dynasty poets Li Po and Wang Wei. They also recalled the "swan," Miss Wulannoy, a ballerina from the Soviet Union who acted in the ballet "Swan Lake." Which is more beautiful, the bird watchers wondered, the swan in nature or in art? In the final analysis, they concluded, the former is better.

Before I separated from the *niao mis* the next morning, Mr. Feng said to me, "Many men and women are keen on enjoying birds in the wild in our country, but we have no organization, popular bird-watching journals and books, or factories to produce special equipment for this field, which must be priced so amateurs can afford them. We cannot use the rich variety of birds in the bird-watching regions unless a vigorous campaign for bird watching unfolds soon. We hope it will become the most important hobby next to amateur flower-growing in China." □

Zhang Zhi-yen is an ornithologist living in the Peoples' Republic of China.

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Courtesy Chester Beatty Library and Gallery of Oriental Art, Dublin

MERLIN WORE A POINTED HAT

Jack Connor

As dusk darkens at the local marsh, you're tiptoeing along the edge of the water, binoculars held high and ready, when a bird flushes from the reeds 50 yards in front of you. Broad wings, strong flap, football-shaped body, thick neck tucked in a tight "S"—it's a night heron, obviously. But it's wearing that confusing plumage, brown with white spots, that both species of night heron wear in their first year. It flies away, legs trailing behind the tail, straight into the sunset.

Is it a black-crowned or a yellow-crowned?

If your experience is like most birders', you've heard many times that one of the two night herons has noticeably longer legs. And, if you're truly typical, you've forgotten which one it is. All birders forget field marks. In fact, unless you have a photographic memory, you have forgotten more field marks than you can possibly remember. If it's not black-crowned vs. yellow-crowned that stumps you, it's female house finch vs. female purple finch, or chipping vs. clay-colored sparrow, or merlin vs. peregrine falcon. "I know a field mark separates these two," you've found yourself thinking. "I just can't remember what it is."

All birders wish they had photographic memories. I sometimes wonder if we want them so much that we pretend to ourselves that we do.

One common technique for learning the songs of birds is the use of memory tricks—mnemonics—but few birders seem willing to admit that their visual memories also need assistance.

Mnemonics may be as old as civilization. Mnemosyne was the goddess of memory in Greek mythology, and the Greeks and Romans used mnemonics to memorize the *Iliad*, the *Odyssey*, and other poetry before the written word became widespread. Some scholars have argued that poetry originally developed because rhymes and metaphors are such useful mnemonic devices: the need to remember came first, the poetry came second. Whether or not that's true, there's no doubt that mnemonics can be very effective.

The Mind of a Mnemonist, A. R. Luria's fascinating study, describes the techniques of the Russian he calls "S." who could memorize strings of random numbers or nonsense words, complicated and meaningless mathematical formulas, even whole poems in languages he didn't know, and repeat them with unfailing accuracy a dozen years later. S. did not have a photographic memory. He depended entirely on his ability to convert words and numbers into mnemonic images.

The contemporary American mnemonist Harry Lorayne uses the same method in his act—which includes memorizing the names and faces of each member of his audience, sometimes as many as a thousand. Lorayne claims that his real memory is actually weak. He originally took up the use of mnemonics because he couldn't remember much without extra help.

Why do many birders forget that it's the yellow-crowned night heron that has the longer legs? Because we have never really tried to remember the fact in the first place. The length of a night heron's legs is a rather humdrum piece of information, and so it glides by the mind's eye as we thumb through the field guide. "In most cases," Harry Lorayne has explained, "forgetting is not getting."

If you're truly typical, you've already forgotten which night heron has longer legs.

To remember the night herons' leg lengths you must stop to convert the humdrum fact "out there" in a book to a sharp image "in here," in your head. Both herons have long names—two long names for two long birds—but one is a touch longer, and so you might picture both names flying from left to right across the page:

black-crowned night heron
yellow-crowned night heron

The "y" in "yellow" trails behind, like the real bird's legs.

Can you depend on your real memory to separate eastern wood pewees from *Empidonax* flycatchers? Me neither. The separation should be an easy one, but before I constructed a mnemonic, empid vs. pewee stumped me dozens of times. A flycatcher would flick down from the canopy to perch on a tree branch 20 feet overhead, and while better birders were considering such respectable questions as "Which kind of *Empidonax* is this—willow? alder? Acadian? yellow-bellied?" I was stuck at an elementary fork of confusion: "How do I know it's not a pewee?"

One field mark that separates the two groups is easy to spot: empids have eye-rings; pewees do not. How to remember this? Change the standard translation of the pewee's call from *pee-o-weee* to *See? We seeee*. Which will remind you that pewees don't need glasses (eye-rings); they see well enough without them.

If you find that sequence so idiosyncratic or complicated that it would be worthless to you, my next point is made: A mnemonic works best (and sometimes only) for the mnemonic maker.

I have some mnemonics I can hardly explain to myself: "Gadwalls wear whitewalls," for example, somehow helps me remember the wing patches on the trailing edges of gadwalls' wings. "A plain face for a plain bird" reminds me that female house finches have less interesting faces than female purple finches (and in New Jersey, at least, a house finch is a less interesting find.) Renaming the clay-colored sparrow the "clay-collared sparrow" has helped me remember its distinctive gray nape. "Merlin wore a pointed hat" reminds me that merlins have harder-edged, more triangular wings than peregrines. "Peregrines fly like sea turtles swim" somehow helps me remember the

DARRELL GULIN

Black-crowned night heron

JOE McDONALD

Yellow-crowned night heron

big-chested fluidity of peregrines in flight. Raptor expert Pete Dunne can separate a merlin from a peregrine at three times the distance I can, maybe because his mental image is even weirder than mine. "The flap of a peregrine," he claims, "travels down its wing like the roll in a garden hose when you shake it."

If Merlin the magician doesn't wear a pointed hat in your mind's eye, if clay is not gray, if eye-rings don't make you think of glasses, if the names "yellow-crowned night heron" and "black-crowned night heron" don't strike you as long and odd, trying to memorize the mnemonics above will only add to your difficulties. The make-or-break element of every mnemonic is the component that jumps out at you, *the component you don't have to memorize.*

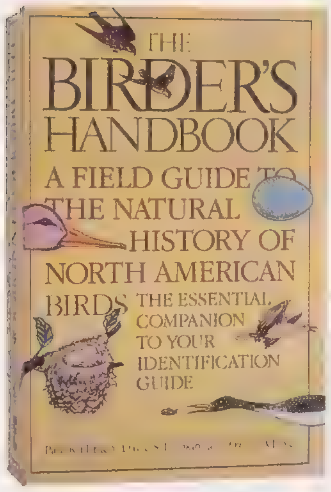
As you set out to construct a mnemonic, you might want to close your eyes. Ask yourself, "What do I see when I think of this bird's name?" The subtlety of the particular field mark you want to link to the bird's name is not important. You can always create a mnemonic, no matter how complicated the identification puzzle. Any birder who has moved past distinguishing pewees from *Empidonax* flycatchers, for example, to the far more difficult challenge of distinguishing *Empidonax* species from one another might consider turning to mnemonics. Otherwise, the dozens of details involved in mastering this 10-species complex—the western shows almond-shaped eye-rings, the willow shows hardly any eye-rings at all; the dusky has a small bill for an *Empidonax*, the bill of the Hammond's flycatcher is still smaller; and so on—can give you a severe case of field mark overload.

The trick is to take one species and one field mark at a time, and rely on your subjective associations to tie "out there" to "in here." The book tells you the willow flycatcher's eye-rings are fainter than other empids'. What does the word "willow" suggest to you? Weeping? O.K., then, how about picturing the willow flycatcher weeping so hard that its eye-rings are washed out? The image is the important thing—a flycatcher crying—but in words the mnemonic might read: "Willows weep their eye-rings away."

You'll often find that one image helps you remember the field marks of other species, or other field marks of the same species. Do you have trouble remembering whether it's the willow or the alder flycatcher whose call is that sneezy *fitz-bew*? It's the willow that sneezes. It has a cold. That's why it's crying! "The willow weeps its eye-rings away because it has a cold: *ah-choo! (fitz-bew!).*"

I better stop here. The discussion is veering into the idiosyncratic again, and if I keep going I might find myself explaining how I use the "dangling y" yellow-crowned night heron image to remember that a totally dissimilar bird, a certain songbird, wears a vest pocket handkerchief in both adult plumages.

Let's end with a challenge. Can you guess that songbird without the explanation? The association between it and the night heron is made because the songbird is one of the few (only five) North American nesters with a longer name than "yellow-crowned night heron." A free copy of *The Mind of a Mnemonist* goes to the first reader who names the bird—if I can only remember where I put that book. □


THE
BIRDER'S
HANDBOOK
A FIELD GUIDE TO THE NATURAL HISTORY OF NORTH AMERICAN BIRDS
THE ESSENTIAL COMPANION TO YOUR IDENTIFICATION GUIDE

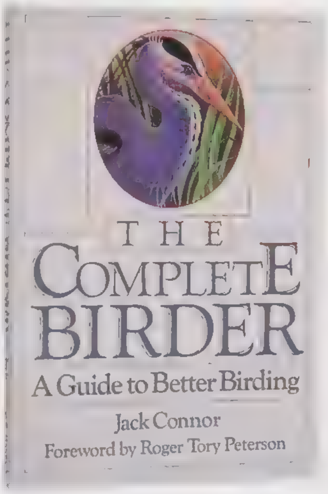
THE BIRDER'S HANDBOOK

by Paul R. Ehrlich, David S. Dobkin, and Darryl Wheye. 1988. Simon & Schuster, New York. Black-and-white illustrations. 785 pages. $14.95 (paper).

Nothing is quite so intense as the convert's zeal for a newfound interest. Hence, it is not surprising that ecologist Paul Ehrlich, recently a "born again" birder, has made a major literary contribution in ornithology. Ehrlich is, after all, a gifted and prolific scientist and author who has produced a string of well-known books interpreting contemporary biological issues for the science-conscious public. Just as two of his previous books, *The Population Bomb* and *Extinction*, have become classics in their fields, his latest effort, *The Birder's Handbook*, should become a standard reference for all American ornithologists, amateur and professional.

This book is actually two books in one. Half of its pages, the even-numbered ones, contain information-packed species accounts of North American birds. These mini-biographies present a modern-day alternative to Arthur Cleveland Bent's classic 23-volume series, *Life Histories of North American Birds*, a magnum opus that took half a century to produce and today remains a primary source for basic information on the biology of North American birds. In contrast to Bent's species accounts, however, which encompass pages of delightful prose, *The Birder's Handbook* telegraphs at least 20 key life-history characteristics of each bird into half-page accounts. Ehrlich, Dobkin, and Wheye use clever symbols and abbreviations to convey characteristics of eggs and nests, clutch size, incubation pattern, length of incubation and nestling periods, development and care of young, and foraging methods. Other subjects, such as breeding biology, behavior, conservation status, and important published references, are treated in short paragraphs. Identification is not covered, but for each species the authors have provided cross-references to the appropriate pages in the popular field guides.

The rest of the book is a series of 247 engaging essays on a variety of topics in avian biology, spanning physiology and anatomy, breeding biology, behavior, taxonomy, ecology, and conservation. These essays run along the odd-numbered pages and comprise a remarkably extensive and accurate review of ornithology, rivaling the diversity of a textbook. Indeed, the bibliography of this book contains a more extensive compilation of references than is found in many ornithology texts. To help integrate the two parts of the book, essays that mention a particular bird are cross-referenced at the end of that bird's species account. *The Birder's Handbook* covers so much ground that it has something to offer almost everyone interested in birds—birders, scientists, students, and conservationists. Because of the book's unusual format it does not beg to be read, but it should be, and I recommend it as a "must" for all ornithologists. Once you've learned how to identify birds with your field guides, turn to this book to find fascinating details of birds' lives. —*Stanley A. Temple*



THE COMPLETE BIRDER: A GUIDE TO BETTER BIRDING

by Jack Connor. 1988. Houghton Mifflin Company, Boston. 28 black-and-white drawings, 285 pages. $18.95 (cloth), $8.95 (paper).

Here is a thoughtful, discursive guide consisting of essays focusing on 12 aspects of field ornithology. Do not be misled by the title; Connor does not intend to provide an everything-you-need-to-know compendium. "Complete" seems to mean a look at how to be complete: in approach, attitude, or philosophy. The subtitle, "A Guide to Better Birding," more aptly describes the book.

Connor's 12 essays focus on five bird groups that are difficult to identify (warblers, hawks, shorebirds, terns, gulls), three seasons (winter, summer, migration), and four aspects of the mechanics of birding (optics, acoustics, the "sporting science," and "the inner game"). Although I do not always agree with Connor's book, I really like it. To a large extent it reflects the author's personal approach to birding and bird identification. *The Complete Birder* is aimed at the beginning or intermediate birder, yet Connor is not didactic and is perhaps best described as a mentor. His information is good and his logical, analytical approach is one to be emulated. Dipping in and out of a variety of subjects, he mixes anecdotes with quotations from legendary birders. These quotes are a nice feature, as they come from fascinating people who should be celebrated just as the birds are.

Let's examine a representative chapter on one of the bird groups, shorebirds. Connor does not intend to attain the completeness of, say, Peter Hayman's *Shorebirds* (Houghton Mifflin, 1988), which is listed in his bibliography (although, oddly, not mentioned in the chapter). Instead he outlines a process of identification by elimination, quoting such leading field birders as Larry Balch, Tom Davis, Lars Johnson, Frank Nicoletti, Allan Phillips, and Claudia Wilds.

The chapter begins with a look at the astounding migrations of shorebirds. Connor then lists five sorting principles to use for zeroing in on an identification: learn the birds' habitat preferences; be deliberate since shorebirds require closer attention than most birds; concentrate on standing birds since you can see more detail on them; study the silhouettes, postpone the plumages; and "divide and conquer." He also touches briefly on plumage sequences.

"Divide and conquer," Connor's method of assigning any shorebird species to one of six groups, enables the observer to focus on a limited number of species. By "divide" he means pigeonhole a bird into one of six divisions: plovers; instantly identifiable shorebirds such as avocets and stilts; odd sandpipers like curlews and godwits; peeps; longlegs (yellowlegs, stilt sandpiper); and "plumps" (for example, dunlin, knot, and turnstones). Some of these categories I find a bit contrived, such as the "plumps" and "longlegs," but they do illustrate the kind of sorting process that birders perform, sometimes almost unconsciously. The chapter is embellished with helpful charts and tables.

Unfortunately, identification by process of elimination has its limitations. Another minor disappointment in this and the other chapters on identification is the limited emphasis on the importance of vocalizations. I also disagree with some of Connor's statements—for example, that the solitary sandpiper is "not as much of a loner as the snipe" (p. 181) and that the least sandpiper is less vocal than the spotted sandpiper in flight (p. 182). And, except for the curlew sandpiper, Connor fails to mention any stray Eurasian species.

The seven chapters on the seasons and general birding subjects are excellent overviews. My favorite is "The Inner Game," on the psychology of birding. The professional psychological and psychiatric literature is bereft of writing on birding; the human side of ornithology, the how and why we do it, needs to be more fully addressed by contemporary writers as Connor has done here.

In this age of specialization, when birders can choose from an abundance of books narrowly focused on single bird families (there are several dozen books on owls alone), specific localities such as individual national parks, or activities such as bird photography or hawk watching, gifted generalists such as Connor who write in the context of a wider focus are urgently needed. Any birder should enjoy reading this book and benefit from it.

—*Henry T. Armistead*

GONE BIRDING! VCR game by Rupicola Productions, Walpole, Massachusetts. 1988. Available in Beta and VHS. 126 minutes. $79.95.

I was doing so well. I'd visited Galveston, Texas, and spotted 180 species, then Los Angeles, California, where I'd ticked off 125 more. Then my troubles began. Just before I left the city a thief stole my spotting scope from the back seat of my car. Then, hot-footing it to Winnipeg, Manitoba, to look for great gray owls, I heard about a possible sighting of an ivory-billed woodpecker in New Orleans. I flew on down but couldn't find the woodpecker. From Louisiana, the rest of my itinerary—Cypress Hills, Saskatchewan, and Acadia National Park in Maine—seemed out of the question. Demoralized, I went out to the kitchen to mix a drink.

I could do that with ease, because throughout my trip I had never left my living room. My wife, Judy, and I were trying out a new video game, Gone Birding!, which despite these few setbacks, turned out to be a whole lot of fun.

I had no idea what to expect when I first received the game. But I've been a game lover since youth, with fond memories of Clue, Risk, even Candyland, so I immediately felt at home with the items I found inside the box. First came the game board, which looks like a map on the back of an airline magazine, except the routes on this map connect birding hotspots instead of major airports. Under the board were lots of accessories—tokens, hotspot cards, surprise cards, rare bird alert cards—and the heart of the game, a two-hour videocassette.

Gone Birding! has fairly simple rules and play. The goal is to rack up more species than anyone else in a mock trip around North America. Here's how it works.

All players are dealt a hand of hotspot cards from which they secretly choose a route around the continent. Landing upon one of these assigned hotspots nets a player a certain number of species. But the players don't roll dice to move around the board. Instead, for each round of play they watch a video "trip" and attempt to identify the bird species that appear on the screen. The number of moves each player takes during each round is determined by the number of species the player identifies correctly. One game consists of six rounds of play and therefore six video trips, each of which presents from 10 to 12 birds.

Judy and I played Game 1, which took us to six locations including the South Dakota prairies, Florida's Gulf Coast, and an open midwestern field. We agreed that the bird photography was excellent and the accompanying bird sounds were generally clear and accurate, and we had little trouble identifying species with which we were familiar. We also had a great time trotting our tokens from hotspot to hotspot, dealing with good and bad luck served up on the surprise cards, and rerouting each other with the rare bird alert cards. Playing time was under two hours, and one of us was victorious.

Gone Birding! was obviously developed in consultation with experienced birders and is well conceived. For example, the number of species you "see" at each hotspot is based on the actual number of species present in that area. The surprise cards are based on real-life experiences: "any player wearing eyeglasses finds them fogging up. Subtract 10 species." Also, the game can be enjoyed by players competing at one of three levels. Say a wood duck appears on the screen. Those playing at the novice level score a point by merely writing down "duck." Birders must write "wood duck," while experts must know the bird's genus, *Aix*.

Gone Birding! is also educational. All players are bound to pick up something new about birds and birding with each round of play. The game as a learning tool has some limitations, however. For one thing, identifying the birds is not discussed. Nothing says, for example, "To distinguish between hairy and downy woodpeckers, examine the relative lengths of the bills." Therefore, if you get an identification wrong on the screen, the video may not help you learn to get it right in the field.

Another problem with the game is its potential to be used up. It is advertised as containing ten replayable games, but once you've seen a video trip and learned the birds, is that trip really replayable? On the South Dakota prairie trip will you remember that a chestnut-collared longspur is a chestnut-collared longspur because it looks like one or because it appeared between greater prairie chicken and lark bunting?

We had fun with Gone Birding! and I'm looking forward to the next nine games. After I've played them all once, though, the "full-color video adventure in bird identification" may lose some of its freshness and appeal. This, combined with the steep price, might make it less than a best seller.

—*R. E. Bonney, Jr.*

BIRDER OF FORTUNE

Pete Dunne

JON REIS

"Can I help you with something . . . special?"

The sky opened up, clearing 42nd Street. I aimed for an innocuous storefront sandwiched between an enterprise called Massage Plus, and another touting Madam Limbo—Mystic Reader. I might have aimed for Madam Limbo's, but I already knew my fortune. I was going to miss my bus.

A hand-printed sign taped to the door caught my eye: BIRDER OF FORTUNE OUTFITTERS.

"Odd," I thought. "Never heard of them." Curiosity and trepidation played tug of war with my resolve. Curiosity won a close decision.

The place looked like an IRA stronghold and smelled like the inside of Alexander Wilson's boot. The first thing I noticed was a bigger-than-life-sized poster of Chuck Norris. He was dressed like an armored division and ripping a National Geographic field guide in two. The poster read: APPLESAUCE! KILL ALL THE BIRDS AND LET PROTEIN ELECTROPHORESIS SORT IT OUT.

"We have it in wallet size, too," a voice offered.

I turned to find myself nose to nose with the proprietor, an animated manikin who looked like he'd been fed to moths. He smiled, filling the air with the scent of tuna on rye.

"You must be Mr. M.," he observed, nodding cheerfully. "You're going to be very happy with this year's bird. Another North American first, I believe."

"What?" I whispered.

"Oh, dear," the proprietor mumbled. "Aren't you the gentleman from the Greater Rio Grande Valley Chamber of Commerce?"

I shook my head.

"Oh, my mistake," he said, studying me closely. "Are you a new customer? Can I help you with something special?"

"No, thank you," I said, smiling, measuring the distance to the door. "Just looking."

He spread his arms in a gesture of welcome. "Don't look! Find. Only tyros look," he counseled.

I wandered over to a pile of Peterson's new western field guides. ("Strange," I mused. "They aren't out yet.") Each guide bore an inscription in red ink: "Thanks for the Lifer," signed, "Rog."

"You can have them personalized," the proprietor shouted.

I nodded slowly. "I think he prefers "Roger."

The proprietor looked unhappy. "Well, 'Rog' sounds so much more chummy, don't you think?" Then he brightened. "But for a little extra we can customize one for you."

I skulked down one of the aisles, past a special bird-banding section featuring Italian designer mist nets, three grades of Tanglefoot custom blended for your climate and region, Stinger rocket net launchers, and a global assortment of prechecked checklists. Ghost-written rare bird report forms, cross-catalogued by state and species commanded another full wall. Just fill in your name, the location, and the date. Documenting photos $10 extra.

In the back of the shop was a target range. Under a sign that read PUT BIRDING'S FUTURE IN YOUR HANDS! was a bulky pair of binoculars and an open box of snap-on filters. I attached a filter marked "waterfowl" and turned the unit down range. Suddenly, the binocular field was filled with labeled duck silhouettes. Identification was merely a matter of matching the stuffed bird down range with the silhouette in the glass. Pretty handy, actually.

"Try the squelch button," a tuna-tainted voice pleaded. "That's the best part."

I superimposed a silhouette marked "smew" over a stuffed gadwall, pushed "squelch" and watched, horrified, as the image of the gadwall was trimmed to fit smew contours. I tried silhouettes of muscovy, whooper swan, and Labrador duck with the same results.

"But with this thing, you can make any bird look like anything you want!" I protested.

"That's right," the proprietor agreed. "That's why it's so expensive. Listen," a voice close to my ear whispered, "why don't you and I step around back. That's where we keep the stuff we reserve for our very special customers."

I started for the door, but bumped directly into the paunch of the winner of this year's J. R. Ewing look-alike contest.

"Howdy," he drawled. "I'm here to pick up that happy eagle critter we ordered."

"Harpy eagle," I corrected. "Talk to that man right there," I said, pointing, and then I ran all the way to the Port Authority Bus Terminal, stopping only to place a call to Clay Sutton, co-author of *Hawks in Flight*. Clay and I have a standing wager regarding the next vagrant raptor to turn up in North America . . . and I wanted to change my bet. ☐

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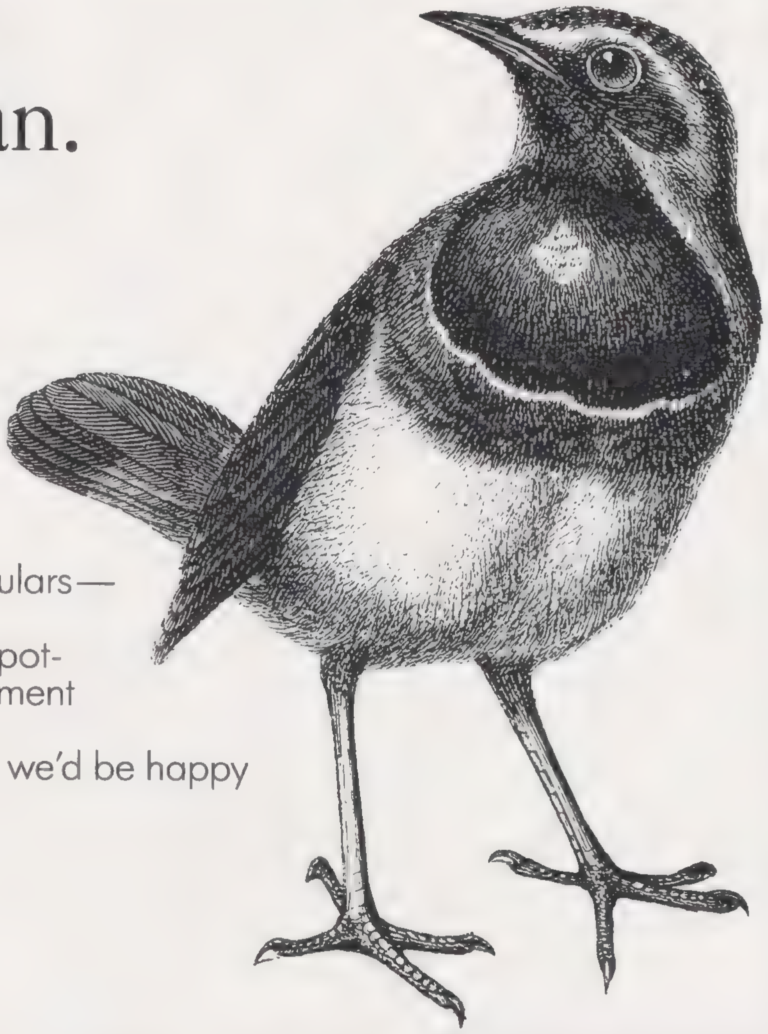

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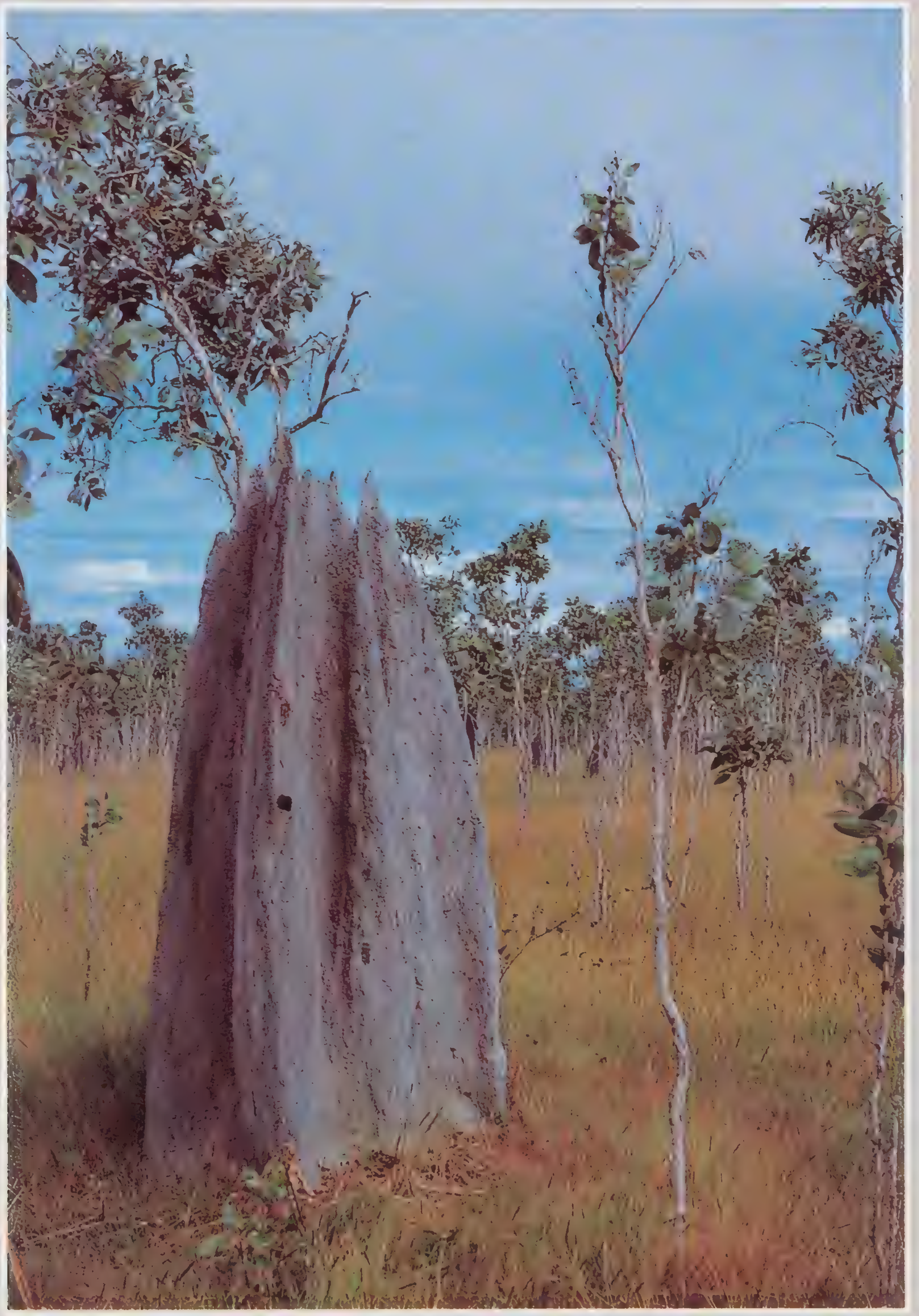

Cornell Laboratory of Ornithology

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Quarterly

Spring 1990

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THE LIVING BIRD *Quarterly*

Cornell Laboratory of Ornithology Spring 1990/Vol. 9 No. 2

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Cover: For the great gray owl, this view of ash-dusted conifers in Yellowstone National Park is hardly bleak. Voles and other small rodents are easier to find and capture in the clearings opened by the summer wildfires of 1988. Photograph by Tom and Pat Leeson.

Back cover: Widespread in North America, ospreys eat mostly fish and commonly nest near water in loosely constructed treetop platforms. Some late-nesting ospreys lost chicks in the Yellowstone fires; others took advantage of the situation, feasting on fleeing squirrels and other small rodents. Photograph by Larry R. Ditto.

Right: In a scene reminiscent of the Disney classic *Bambi,* a mule deer scrambles from approaching wildfires. The animated feature has shaped our perceptions of forest fires. Photograph by Mary Clay.

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Dunne sinks his stropped canines into the 21st century.

p. 10 When a forest flame dies, smoke gets in your ears.

Don't Leave Home Without It

Jack Connor's advice (Summer 1989) to draw a picture of a mystery bird instead of consulting a field guide "and so take the next step toward self-reliance" is lame in reasoning.

The guide will be the final arbiter, whether used in the field or in the library. If your object is to memorize features, copy the drawings in the books. The subjects will stay put and you won't have to fuss with binoculars.

Connor's British birder friend has thought it out more incisively. Seasoned birders don't carry a guide in the field because they don't want to be mistaken for beginners.

As one who is not a beginning birder and who *always* carries a field guide, I reject Connor's patronizing advice. As long as I have the strength and health to do it, I shall carry my bird guide in the field, as well as my guides to the wildflowers, butterflies, and mushrooms. I only regret I can't carry my *Encyclopedia Britannica* so that I could look up everything on the spot.

John E. Dineen
New York, New York

Who Won the Bet?

In the Summer 1989 issue you published a picture of a flock of red-winged blackbirds as an advertisement for your bird population monitoring program and asked readers, "How many birds do you see in this picture?" At the bottom of the page you gave your answer: approximately 15,000.

I represent the Bird Research Section of the Denver USDA Wildlife Research Center. This group has many years of experience counting large flocks of blackbird species. I circulated your picture to my colleagues and asked for their estimates. Counting expertise and relative accuracy have long been the subject of good-natured disagreements among our staff—I thought this exercise would settle a few bets.

The resulting 16 estimates averaged 7,211 birds and ranged from 2,500 to 28,000. We have been at this too long! How did you arrive at your estimate?

David L. Otis
Denver, Colorado

Bird-counting specialist Steve Sibley explained that he divided the picture into 16 equal squares, then counted the birds in each square. He made an exact count in those squares with few birds; in more densely populated squares he used a magnifying loupe and the judgment accumulated over many years of experience.

Steve suspects that the wide variation in your counts stems from differing interpretations of the depth of the flock in the photograph. The count would be quite different, for example, depending on whether you assumed the flock extended to the trees in the background as well as flying in the foreground.

Error Department

I believe that the caption for the 'akiapola'au ("Silent Hawaii," Summer 1989) is in error. I've never heard of *Hibiscadelphus* being pollinated by 'akiapola'au, and to the best of my knowledge the two do not have overlapping ranges.

Jaan Kaimanu Lepson
Honolulu, Hawaii

Mr. Lepson, a zoology graduate student at the University of Hawaii, took the photo of the unusual honeycreeper. We apologize for the error.

DEAR MEMBER:

"Earth Day, April 22, marks a time of warning. We are fouling our streams, lakes, marshes. . . . We are burying ourselves under 7 million scrapped cars, 30 million tons of waste paper, 48 billion discarded cans and 28 billion bottles and jars a year. A million tons more garbage piles up each day. The air we breathe circles the earth 40 times a year, and Americans contribute 140 million tons of pollutants: 90 million from cars—we burn more gasoline than the rest of the world combined—15 million from electric-power generation, one-third of the world's total. . . . There are 5,500 Americans born every day; 100 million more by 2000. We already consume and waste more than any other people."—Jack Shepherd, senior editor, *Look*, April 21, 1970.

Earth Day plus 20 years—the good news: number of whooping cranes in existence in 1970: 71. In 1989: 217. Miles of designated U.S. Wild and Scenic Rivers in 1970: 868. In 1989: 9,278. Number of states with formal, funded nongame wildlife programs in 1970: 2. In 1989: 50.

Bad news: world human population in billions in 1970: 2.72. Projected for 1990: 5.32. Number of species on the official U.S. endangered and threatened list in 1970: 92. In 1989: 539. Millions of tons of solid waste generated in the U.S. in 1970: 100. In 1986: 158. North American population of breeding mallards in 1970: 10,379,000. In 1989: 6,119,000. Estimated number of African elephants in 1970: 4.5 million. In 1989: 500,000 – 650,000. [Figures quoted from *National Wildlife* February–March 1990.]

Obviously, the Earth is in serious trouble, but how serious is difficult to say. Scientists have learned over the past 20 years that the appropriate measurement of environmental indicators, as well as the validation and proper interpretation of the data, are problems in themselves.

We at the Laboratory realize that knowledge of the planet has grown tremendously; however, much work needs to be done. Our contributions include preserving bird song in our Library of Natural Sounds, studying elephant and whale vocalizations, and gathering data for the study of bird populations, behavior, and ecology. We encourage amateurs to collect these all-important data through such programs as Project FeederWatch, Christmas Bird Counts, and Breeding Bird Censuses. The Lab's primary mission is to provide the tools needed by researchers to help them acquire the data that, we fervently hope, will rescue the planet from the habits of humankind.

On Earth Day 1970, author Kurt Vonnegut, in a remark directed at then president Richard Nixon, opined, "If we don't get our President's attention, this planet may soon die. . . . I'm sorry he's a lawyer; I wish to God he were a biologist." —The Editors

Tilting at Windmills

Birds of prey are flying smack into the whirling blades of the 40-foot windmills that dot the hillsides of Altamont Pass in California. Since 1986, almost a hundred eagles, hawks, falcons, and owls have died in midair collisions with the towering structures.

Raptors migrating to Mexico for the winter hunt for food in the pass. The migration route takes the birds over the hills near Livermore, where 6,700 windmills constitute the world's largest and most productive wind farm.

United States Wind Power, which operates about half the Altamont windmills, is funding research on ways to keep raptors away from the deadly blades. Meanwhile, the California Energy Commission would like to know why birds with such sharp vision are hitting the fan. Biologists with Biosystems Analysis, the company hired by the state to study the problem, speculate that the raptors may mistake the windmills for trees, or are concentrating so intently on their prey that they do not notice the windmills until it's too late.

Beware of Cat

The chief threat to some songbird populations might not be habitat destruction or toxic pesticides but ordinary house cats. Cats are probably the principal predators of birds and small mammals in rural America, says researcher Stanley Temple of the University of Wisconsin, who estimates that in the Dairy State farm felines kill tens of millions of birds each year.

In the first stage of a three-year study, Temple surveyed Wisconsin farms to get an estimate of the total farm cat population. To measure the kill rate per cat, he spent evenings tracking cats on the prowl using radio telemetry. The study is funded by the U.S. Department of Agriculture as part of a broad program to determine the reasons behind the decline in many bird species that nest on agricultural lands.

With a population of about 1.2 million, cats probably outnumber foxes and skunks in Wisconsin's fields and woodlots, says Temple. He reports that small prairie-nesting birds such as meadowlarks, bobolinks, upland sandpipers, and sparrows are particularly vulnerable to the predatory tabbies.

Read My Lips— No Wetland Loss

President George Bush signed the North American Wetlands Conservation Act on December 13, 1989. The landmark act is aimed at enhancing and restoring wetlands under the guidelines of the North American Waterfowl Management Plan (NAWMP).

The North American plan itself is widely considered one of the most important environmental efforts on this continent in this century. Together NAWMP and the new wetlands act are intended to provide healthy habitat not only for ducks and geese, but for shorebirds, marsh birds such as bitterns, and a host of other animals and plants that rely on wetlands. The new act establishes a nine-member wetlands conservation council that will evaluate wetland conservation projects and set priorities for funding them. The act authorizes the annual appropriation of $15 million to accomplish these goals.

Harry D. Knight, president of Ducks Unlimited, the world's largest private wetlands conservation organization, commended President Bush for fulfilling his pledge to make "no net loss of wetlands" a national goal, and for keeping his promise to sign "a bill to conserve North American wetlands in 1989." Said Knight, "the new law will do much to ensure the perpetuation of the continent's waterfowl and will provide a myriad of benefits for wildlife in general."

Swept Away

When Hurricane Hugo battered South Carolina last September many bird populations, like the residents of Charleston, were left homeless. Three endangered species were particularly hard hit, and the U.S. Fish and Wildlife Service (USFWS) is still conducting surveys to measure the devastation.

In South Carolina's Francis Marion National Forest, 135-mile-an-hour winds destroyed nearly all of the mature pines that serve as nesting trees for 500 breeding pairs of endangered red-cockaded woodpeckers. According to USFWS reports, about 75 percent of the woodpeckers died in the storm or from predation or exposure afterward.

Before hitting South Carolina, hurricane winds stripped 80 percent of the vegetation cover from Puerto Rico's Caribbean National Forest, decimating the tiny population of the endangered Puerto Rican parrot. Only six birds from a total wild population of 46 survived the storm. Elsewhere on the island, a remnant population of another endangered species, the yellow-shouldered blackbird, was nearly wiped out.

The swath of destruction ripped out by Hurricane Hugo reminds us how vulnerable endangered species are to natural and manmade disasters. The problem is exacerbated when, as in the case of the red-cockaded woodpecker and the Puerto Rican species, populations are already confined to unnaturally small and isolated fragments of habitat by the pressures of human activity.

JAMES L. MAIRS

Erma J. Fisk, Special Friend, Dies

Ornithologist, author, teacher, and special friend of the Lab Erma J. "Jonnie" Fisk died January 11, 1990, at her home in Orleans, Massachusetts. She was 85.

During the last 25 years Jonnie devoted much of her energies to bird research and conservation. She was a member of the Lab's Administrative Board for many years, unselfishly and unfailingly giving of her enthusiasm, energies, and expertise. She also served on the boards of six other environmental organizations, carried out bird-banding research around the globe, and wrote numerous scientific articles and three acclaimed books. Royalties from her most recent book, *A Birdwatcher's Cookbook*, are pledged to the Laboratory of Ornithology.

Jonnie's love of life was contagious. She always viewed her volunteer work as a series of opportunities, and she was quick to extend thanks to people and organizations that offered her an opportunity to assist them. We offer our profound thanks to Jonnie Fisk; we will miss her.

A GIFT TO WILDLIFE

Jill Crane

This is the story of a man: a U.S. Fish and Wildlife Service biologist, conservationist, and pilot; a former member of the Peace Corps; he was almost a priest, always a Fed. He's not rich enough to own an airplane or influential enough to spend a week fishing with George Bush. He's not famous: he needn't hide behind a false mustache while lunching at the local pizza joint. In other words, he's a regular guy living cheek-to-cheek with the Platte River in Grand Island, Nebraska, just doing his job and trying to change the world.

To meet John Sidle is to meet an oxymoron: the easygoing tenseness, quiet passions, bemused integrity, soft-spoken candor. The eyes are the most notable feature: blue and often surprised, no, startled, shocked, as if he were witnessing the sky rolling up like a cheap window shade and the ghosts of dead whooping cranes begging him to please hurry up. The nose and mouth are basic descendant-of-western-European-settler, still determined, but now to protect the solar system's green-blue ball instead of consuming it. Unshorn and unshaven, he emits an aura of the glowing days when we signed petitions for the environmental movement and chanted hymns on Earth Day. The tallish, trim, 37-year-old body carries the head around, bikes, runs, and walks beside the river it loses sleep over trying to protect.

On the walls of his modest house hangs the delicate art of Louis Agassiz Fuertes, and centered above the futon couch, a 17-by-20-inch image of three submerged hippos with only their snouts and incongruously little eyes showing. This last, taken while he was in the Peace Corps, and the picture albums crowded with photos of Zaïre allude to how deeply affected he was by his experiences there. The bookshelves, stocked with books and maps of Zaïre and Congo, where he picked up hippo tusks, hyena skulls, and lions' teeth, do nothing to alter that impression. "I found them on the ground," says John. "They were just lying there."

The Peace Corps days, 1974. Left, two rangers accompanied John into the far reaches of Virunga National Park in Zaïre.

During his 14-year career with the federal government—the first two with the Peace Corps, the remainder with the U.S. Fish and Wildlife Service—Conservationist Sidle has had many chances to get his hands dirty, literally and figuratively. After his Peace Corps tour, a slew of conservation challenges faced him. First, North Dakota, where he slogged through the prairie pothole region stalking wetland easement violators who illegally drained the potholes. He pulled on his waders to manage and maintain the world's largest white pelican colony, Chase Lake National Wildlife Refuge; and he counted geese on North Dakota's 15,000-acre Arrowwood National Wildlife Refuge. Then, in St. Paul, Minnesota, he untangled red tape at the Fish and Wildlife Service's Office of Endangered Species. One of his functions was to recommend species for listing in the *Federal Register* as endangered, a responsibility that required so many hours ringing up officials that he almost needed surgery to remove the phone receiver from his ear.

Barefisted with prose, he spread the conservation message in *North Dakota Outdoors* and *The Living Bird Quarterly*. And today he flies low over the tree-clogged Platte River videotaping habitat and monitoring sandhill cranes as they converge on the shallows of the Platte. Each spring, on their way to their northern breeding grounds, half a million of the pencil-legged birds pause to fatten, rest, and call repeatedly *garooo-a-a-a*.

JOHN SIDLE (2)

What is existence like for a biologist who devotes his life to conservation?

His biography could be that of any biologist: childhood camping and hiking in the Great Swamp National Wildlife Refuge; a Boy Scout merit badge; fishing and canoeing in America's big sky country; theological turmoil and academic drifting during college; and at last, moving west, cooling, settling, finishing school, and trying to figure out what to do for the next 50 years.

"When I graduated from Oregon State University in 1974," says Sidle, "I joined the Peace Corps. I thought Africa would be a fascinating place and I wanted to contribute to its people. I managed large mammals in the Virunga National Park in eastern Zaïre. The park is famous for the mountain gorillas that occur among the Virunga volcanoes. I worked north of the volcanoes where the terrain becomes open wooded savannah, a region populated by hippo, water buffalo, elephant, topi, and cob.

"Unfortunately, poaching was rampant. That's when I got fired up about conservation. Central Africa has few vehicles and supplies and little equipment and almost no trained biologists or park wardens to manage the parks and game reserves. In fact, in 1986, when I returned to Zaïre after a 10-year absence, nothing had really changed, except the 3,000 elephants that had lived in the park in 1976 had dwindled to about 50.

"I did encounter a few surprises, though. When I left the States, people my age had little respect for authority. The Zaïreans have tremendous respect for the chief. Even educated Zaïreans couldn't fathom how or why we were impeaching our chief, Richard Nixon. I remember listening to Nixon's resignation in 1974 on the BBC at 3:30 in the morning.

"After two years in Africa I came home and, of course, I was unemployed, so I decided to return to Oregon to take classes in anthropology, rangeland management, animal ecology, geology. At the same time I toyed with the idea of getting a master's degree in ecology, eventually to study deforestation in Uganda. Then I was offered a job in North Dakota as a U.S. Fish and Wildlife refuge manager.

"I really wrestled with that decision. Did I want to go back to the exciting work in Uganda, or to North Dakota? I took the position in North Dakota. I wanted to experience the wildlife of my own country. I think they offered me the job because I had a pilot's license. Not that they needed a pilot, just someone who could sit in an airplane a long time without getting sick.

"I'll never forget the first trip to North Dakota. I went to the Amtrak station in Washington, D.C., to buy a ticket to Jamestown, North Dakota, and the ticket agent said, 'I don't think we go to Jamestown. I never sold a ticket there.'

"I'm sure you go there," I told him.

"He fumbled through the schedule and finally found it, but said he had never heard of it.

"He sold me a ticket, and when I asked two elderly porters, who had obviously worked 40 years for railroads, directions to the train to Jamestown, North Dakota, they said, 'Jamestown, North Dakota? Are you sure? Never heard of it.' The trip took over 24 hours.

"As it turned out, I accomplished a great deal and learned a lot about conservation. In North Dakota wetland conservation has been the big issue. Ducks breed there, but people continue to drain the wetlands. Some wetlands are protected by the federal government, but many big drainage projects violate state law. We were able to report and fight these projects when drained water entered national wildlife refuge areas, but even when violators were prosecuted and had to pay fines, they continued to drain wetlands.

"The whole time I was in North Dakota, 1978 to 1983, I worked against a backdrop of conflict between the USFWS and the state. It was a winning and losing battle—winning in that from 1960 to 1977 we put over one million wetland acres under federal protection, losing in that many wetlands were still being degraded.

"I was never an avid duck hunter, but many of my colleagues were relentless. Their whole lives were the duck. We were there because we cared about those damaged wetlands. I'd look at them and say to myself, how is somebody going to wreck this—what's the easiest way? Draining, scrapers, bulldozers, backhoes coming over the hill?

"When a job at the USFWS opened in Grand Island, Nebraska, involving controversial Platte River conservation, I applied and landed it. People have been draining the Platte for years, but aquatic birds and shorebirds still need the water. Plovers and least terns nest on sandbars here. They arrive in April and May, breed, and leave in August. The sandhill cranes stay just for a few weeks in early spring. We use a computer to grab video frames of the Platte and analyze them. Over time we form a model of the river which tells us when and how much water the birds require.

Baby hippo with hip defect is left behind by its mother when it can't keep up. Below, 1989, sand along the Platte and John is literally getting his hands dirty.

JILL CRANE

"Maintaining the Platte is a real fight. Public power and irrigation districts want to give up as little water as possible. All parties have hired law firms and, in turn, the law firms have hired biologists as consultants making the entire process terribly slow. Millions of dollars have been spent on this. In the future I see some preservation of the Platte; people are tired of these water projects and really want to protect the Platte's environment. I try to keep cool and derive simple pleasures from my work. I need to believe that I am part of a much bigger effort, and that maybe some day our plans for a wildlife refuge on the Platte will pan out."

Meanwhile, John perseveres. Earlier this year he returned to Congo where he conducted an environmental assessment of a Yellowstone National Park–sized logging concession, where Africans continue elephant poaching.

"If we don't do something soon, we'll be counting our last elephant."

He concluded, "The well-intentioned voice their concern, but action changes the world." □

Watch John go for 10 rounds fighting for the endangered piping plover next time in The Living Bird Quarterly.

HIS GREEN BLADE

The marsh-hawk sailing low over the meadow is already seeking the first slimy life that awakes. The sinking sound of melting snow is heard in all dells, and the ice dissolves apace in the ponds. The grass flames up on the hillsides like a spring fire . . . as if the earth sent forth an inward heat to greet the returning sun; not yellow but green is the color of its flame;—the symbol of perpetual youth, the grass-blade, like a long green ribbon, streams from the sod into the summer, checked indeed by the frost, but anon pushing on again, lifting its spear of last year's hay with the fresh life below. . . . So our human life but dies down to its root, and still puts forth its green blade of eternity. —*Walden*, Henry David Thoreau

COURTESY MARY DURANT (2)

Last December the ashes of Michael Harwood were cast upon the wind above the sanctuary at Hawk Mountain. A spur on the Kittatinny Ridge in eastern Pennsylvania, Hawk Mountain is a special place; the aerial corridor above it has been used as a migration route by thousands of raptors for thousands of years. It was also special to Mike Harwood, so much so that he co-founded the Hawk Migration Association of North America, chaired the first North American Hawk Migration Conference in 1974, and spent untold hours on mundane, administrative toil. He also chose to become its very dust.

Hawk Mountain was associated with all sorts of good experiences in Mike's life. Although he had written books on such diverse subjects as conscientious objection and the American vice-presidency, it was not until the release of *The View from Hawk Mountain* that his writing career focused and really took off.

Hawk Mountain was the first book that Mike, not an editor or publishing house, initiated. The freedom to sew the cloth whole lit his imagination and opened his mind to new ideas that spun out for the rest of his life. *Hawk Mountain* paints an informative yet personal picture of the precarious state of birds of prey. He picked up the environmental thread in his next book, *The View from Great Gull*, and the next, *On the Road with John James Audubon*, and in virtually every nonassigned piece he wrote. Not only had his writing changed, he had changed into an active environmentalist who saw urgent needs that begged to be fulfilled.

Mike's most salient and enduring belief was that a hotbed of amateur ornithologists who wished to participate in bird study existed all over the country, and that they were just waiting to be organized. He was right. Since 1974, scientists have learned a great deal about hawk migration, one reason being that hawk watchers have been out in the field doing the research, sharing the information, adhering to a standard reporting procedure, and publishing regularly.

"The line between the professional ornithologist and the amateur of professional attitude and qualifications has become quite blurred," he wrote in the introduction to the *Proceedings of the 1974 North American Hawk Migration Conference.* "The hawk-migration research that has gone on in North America since the 1930s, with increasing numbers of competent, experienced amateurs spending long hours on lookouts compiling data, has been a major demonstration of the availability of nonprofessional resources to enlarge the body of ornithological knowledge."

Mike operated under the assumption that all increases in knowledge help the conservation of a species. Less than a year before his death, he spoke about the meaning of life: "Insofar as one can distinguish the meaning of one's life, and that is something extremely difficult, if not outrageously impossible to do, it is, I think, to continue to learn. That's where I find my greatest excitement: coming to understand better the world around me." Michael Harwood understood, as witnessed in this excerpt from *The View from Hawk Mountain.* —*Jill Crane*

The rain is over; so, it would seem, is the day's flight. Gradually, our few companions depart. Frank [Haas] and I are determined to be the last watchers off the mountain this evening—to share the solitude as between friends, but otherwise to assume, each of us alone, possession of the space around us. This is the best part of the day: the silence, the aloneness, the clarity and glow of light distilling and magnifying the essence of the season, the essence of the place.

To the north, over Second Mountain on the far side of the broad valley, or to the east, up the Kittatinny ridge, or beyond the Pinnacle and the Donat, there may be a few hawks still in the air, or an eagle or two, headed toward us. The sky is for the moment empty of birds, and has been for more than an hour. But it is full of gray clouds, full of wind. The trees on the ridge before us bend in the wind, and blown leaves fly southward across our view. Except for a few autos crawling the roads far below, the valley has settled into its evening tableau.

Left, at age six in Brookline, Massachusetts, Master Harwood communed with ducks at a local pond. Below, 35 years later, he advanced to watching for hawks in Connecticut.

I don't know what Frank is thinking, but I am musing about change. Here is Hawk Mountain, a small zigzag in the Kittatinny, where a sanctuary was created to protect migrating hawks from the shotguns of a few hundred hunters. It was just one gunning spot removed from the dozens along the ridge in those days, and one out of hundreds in the country, and yet the very act of its becoming a sanctuary went a long way toward stopping the hawk shooting everywhere. So the hawks are safer from shot than they used to be. Yet to protect them from what else threatens them today seems much more difficult. Pollution of the land and the air and the water would have to stop: millions of acres of sanctuary—not 1,400, as in 1934—would have to be set aside and protected not from gunners but from the urbanizers and recreationists.

One can see, even from this quiet lookout over farm countryside, what is happening. Out to the north, one of our landmarks, the Junkyard, with its burden of dead cars, epitome of our no-deposit no-return technology. House trailers and Model Homes, popping up—"overnight, like mushrooms," as Alex [Nagy] puts it—on the edges of farms and on the flanks of the mountains. What was wilderness becomes rural becomes suburban becomes urban. What's to stop us from cementing the planet from pole to pole? Not any moral sense, or reason, probably. Most likely famine, plague, and war; and meanwhile, we've got ours, right? . . .

From the west, another line of showers moves toward the mountain, and Frank and I put on our ponchos. When the rain begins, he settles into his niche between boulders, content to wait it out. But I am convinced that, coming this late in the day, after an hour and a half with no hawks, the rain will put a stopper on what might have remained of the day's flight. I rise from my rock and stuff my gear into the pack, and after a brief debate, Frank agrees I am probably right. We are no sooner off the top of the mountain, naturally, than the shower is over, and we nearly turn back. But the day is about gone, and we continue down the stony path through the aspens and oaks and rhododendron, and come out into the view again at South Lookout.

The sky is clearing, and the wind is sweeping the clouds away overhead. We scan along the purple-black ridge leading to North Lookout, just in case a late eagle has appeared; there are no birds in sight. We turn to continue down toward the road, and pause for a moment beside the roofed bulletin board that stands behind the lookout. As we talk, a big, gray hawk streaks out of the woods—low, only a few feet from us—and heads up along the trail to the first bend, where it vanishes into the trees. We shout "Goshawk!" at each other, and hurry back to the edge of the lookout for another scan of the distant ridge.

There is a marsh hawk coming our way off that ridge, and I follow it with my binoculars as it passes over us, quite high. Frank, meanwhile, has found a golden eagle stroking along the tops of the trees toward the upper watch. We have a pretty good argument over identification until we discover we are looking at different birds, and before I can pick up the eagle in my glasses, it slides out of sight on the far side of the ridge—to pass, as Frank wryly points out, close by the perch we left 20 minutes ago. Beyond the empty North Lookout, the last of the day's sunlight has turned a distant cloud reef to bronze. The end of the day is a crescendo of fleeing grays, golds, purples, blues, the carmine of sunset, the whistling wind, the stolid silhouette of mountain, and space. ☐

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DARRELL GULIN

From a human viewpoint, the Yellowstone fires of 1988 might seem tragic. Viewed in a broader context, however, fires create a mosaic of forests and clearings that supports abundant wildlife.

YELLOWSTONE: NOT BLACK AND WHITE

Terry McEneaney

As the sun begins to rise I drive from my home in Yellowstone National Park, Wyoming, to a stand of burned lodgepole pine. It is spring of 1989. I'm hurrying because I'm going to census birds, and they're easiest to see and hear at dawn. The census will help assess the effects of last summer's wildfires, finally extinguished by snow in November. As I reach my destination in the growing light, pines stand out like charred pencils against the snow that fell last night. The contrast—black pines, white snow—is striking. It seems emblematic of the debate about the wildfires' causes and consequences.

Much of the media's coverage of the fires presented the situation in black-and-white terms: the wildfires themselves were portrayed as a catastrophe, the aftermath as a rejuvenation, a glorious "rising from the ashes." Humans tend to assign such value judgments to natural events. In doing so, however, we oversimplify. The natural world is infinitely complex and doesn't fall easily into such categories as "good" and "bad," or into neat stories with a clear beginning and ending. As the staff ornithologist of Yellowstone National Park, I have a different perspective than the media. I'd like to share some observations on the wildfires and their aftermath as I witnessed them.

We can begin in July 1988. I'm near a road in a lodgepole pine forest. The sky is black; in front of me are motion, light, heat, energy—the wildfire. What impresses me most is the sound, like a large noisy waterfall—only this one keeps advancing toward me. A couple of hundred feet in front of the wall of flames, the wildlife is fleeing. A mule deer leaps out of the forest, hopping on all four legs as such deer do when they're excited. On the ground, dozens of fleeing chipmunks hurry past. Red-backed voles and pocket gophers scurry across the road. Birds have stopped singing, but American robins sound their alarm calls and move quickly ahead of the flames. Dark-eyed juncos and mountain chickadees also fly to safety. It is a classic scene of the sort that many people associate with forest fires.

Here's another classic. A few weeks later, I'm in a boat in Yellowstone Lake watching the flames engulf

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the conifers along the shoreline. In the fire's path is an osprey nest with two young. As the flames approach, the adult male seems anxious; he keeps flying out to catch fish and bring them to the nest. The female, for her part, is feeding the young as fast as she can. It's as if the adult ospreys think they can force the young to fledge if they feed them fast enough. The birds keep calling, and I hear the young peeping. When the fire rages within 100 feet of the nest, the male begins vocalizing, as if trying to coax the young out of the nest. The adults stay with their young until the last possible moment. When the smoke and flames engulf the nest tree, the intense heat finally forces the female from the nest. The pair keep circling nearby; the female darts in and out of the smoke very close to the flames. Finally, in apparent frustration at losing their chicks, the ospreys attack a common raven standing on the lake shore. The raven gets out of there in a hurry.

These events—the animals escaping the forest, the ospreys losing their chicks — may seem tragic from a human standpoint, but they should be considered in the broader context. I can picture the day after I observed the animals flee: I watch a fire creep from a stand of lodgepole pines into an open meadow. Tremendous clouds of smoke billow a thousand feet in the sky. High in the smoke column I see some raptors soaring, including another osprey. Ospreys are primarily fish eaters, but this one has a red squirrel in its talons. Curiously, the bird carries the squirrel head forward as it would a fish; I clearly see the bushy tail hanging down. For predators the wildfires are far from tragic. The bonanza of fleeing prey is so great that like ospreys they will even leave their accustomed niches to profit from it.

The wildfires, then, were a tragedy for the nesting ospreys, a boon for the hunting ospreys, but again a disaster for fleeing rodents. If you consider that thousands of similar stories occur in a wildfire of this magnitude, you have some sense of the complexity of the event. You come to understand, as I have, how inappropriate it is to ask whether the fires were "good" or "bad," and, from a broader perspective, how inappropriate it is to assess natural events on the basis of human values. The same rules simply don't apply. Clearly, to present the wildfires as a simple, black-and-white event is to fail to do them justice.

Benefits to wildlife were apparent even while the fire still burned. Ospreys were not the only birds of prey to profit from it. I had seen raptors hunting along the front line of a fire before, but never such a diversity and never in such concentrations. In the fires north of Yellowstone Lake, I saw bald eagles, golden eagles, peregrine falcons, prairie falcons, American kestrels, Swainson's hawks, red-tailed hawks, northern harriers, northern goshawks, Cooper's hawks, sharp-shinned hawks, even rare great gray owls, all foraging for displaced prey. More unusual still, I saw a red-tailed hawk hunting at eleven o'clock one night in the bright, dusky light of the flames.

NATURE'S CLEANSER

It is the world's first national park, the biggest in the lower 48, and the best-loved. Yellowstone invites the use of superlatives. The Yellowstone River, longest undammed river in the country, flows into Yellowstone Lake, largest lake in North America at such a high elevation — almost 8,000 feet. The Old Faithful Inn is the world's largest hotel made of logs. It is characteristic that the most publicized fire of the century should have occurred here.

The region has excited awe since the first white explorers brought back accounts of geysers, hot springs, obsidian cliffs, and stupendous waterfalls. One explorer told of springs of boiling white, lavender, and pink mud. At first such tales inspired incredulity, some of it merited. Yellowstone does contain "petrified forests," but mountain man Jim Bridger allegedly told about whole regions turned to stone, with petrified grass, antelope, bears — even flowers blooming with crystal petals, and petrified birds in petrified trees singing petrified songs. After 1850, more reliable explorers confirmed that Yellowstone truly was the site of many natural wonders, and in 1872 the land was designated a national park.

Yellowstone is huge—2.2 million acres. Rhode Island would fit inside it twice with enough land left over for several big bird sanctuaries. Besides its scenic and geological attractions, it has healthy populations of buffalo, elk, moose, mule deer, black bear, and grizzlies. Over two million people visit the park each year.

In 1988, as in most years, lightning- and human-caused fires began to burn by early summer. In keeping with the park policy that acknowledges the ecological benefits of fire, "natural," lightning-caused fires were allowed to burn as long as they didn't exceed certain limits, whereas fires caused by humans were suppressed. But by mid-July, in view of the woods' flammability from drought and fuel buildup, authorities decided to start fighting all fires, regardless of origin. Fanned by high winds, however, the fires soon grew beyond control; in the end half a million acres were largely or totally charred.

The subsequent public outcry about the fires included charges based on a misunderstanding of the park's fire policy. Some critics assumed that the Park Service had a universal "let burn" policy and had idly watched as half the park was destroyed; in fact, efforts to stop the fire involved 25,000 people and cost $120 million. The park's policy, of course, was meant to let nature take its course whenever possible. John Varley, Yellowstone's chief of research, had a more reasoned perspective. After the fires, he said, "I don't regret for one moment what that fire did to the landscape." Apparently many people agree: since the fires, the number of visitors has broken all pre-fire attendance records.

—D.R. Otis

Courtesy Kansas State Historical Society

Mountain man Jim Bridger told tall tales of the wonders of Yellowstone. Although its petrified forests are not so extensive as Bridger claimed, the region is still spectacular, and even after the fires of 1988, visitors swarm to the park.

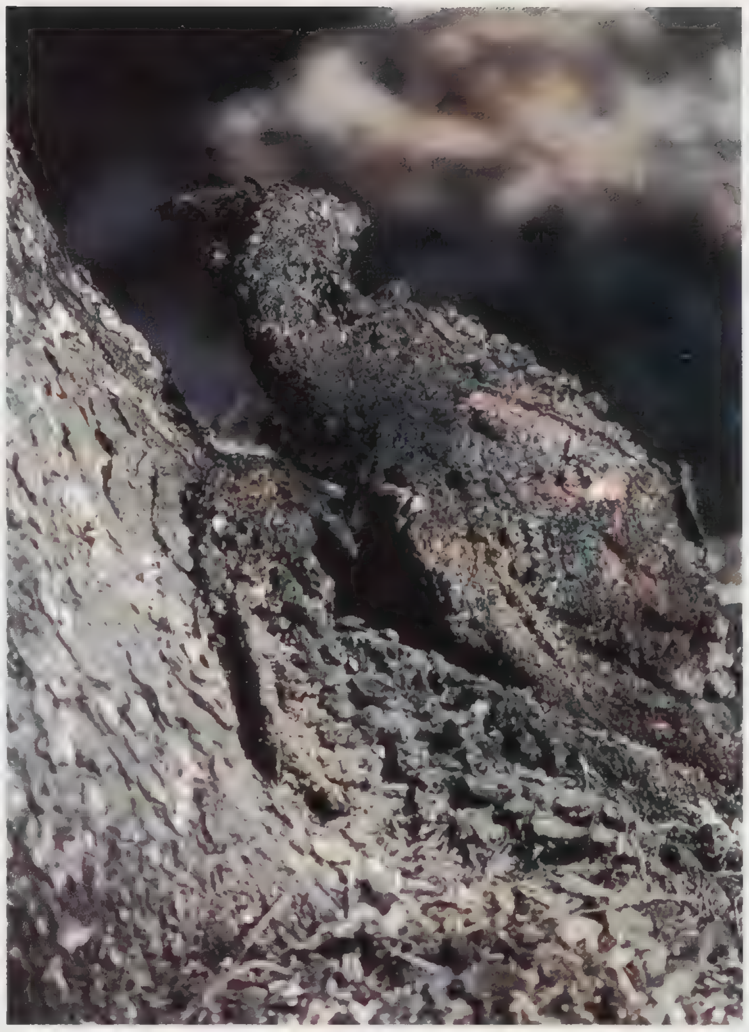
I wondered how the raptors knew to gather here. My theory is that they may have been lured by the gigantic columns of smoke. Ferruginous hawks, for example, are rare in Yellowstone — most years, I feel lucky if I see one or two in the fall. But on September 7, 1988, I saw more than 40 hunting among the open meadows, mostly searching for fleeing voles and pocket gophers. Since this hawk evolved as a plains raptor, and lightning-caused fires have always been common here, over time the hawk may have come to associate wildfire with a bounty of rodents.

I saw other birds — common ravens, whooping cranes, sandhill cranes, great blue herons — hunting the meadows just in front of the advancing fires. I was also struck by the number of birds searching for food in the blackened forest immediately after the blaze. Some of the cones of the lodgepole pine, the most prevalent tree in Yellowstone, release their seeds only when they've been burnt. Lodgepole seeds provided a feast for such birds as the pine grosbeak, red crossbill, and pine siskin.

As I examined burned forests and meadows, I searched for bird remains, but I found very few. Such carcasses would have been blackened like the forest floor, their feathers melted until they resembled black plastic beads. The heat would have shriveled them to less than half the size of the living bird. An 18-inch osprey chick was shrunk to 8 inches; you can imagine how difficult it would be to find a 5-inch warbler. But even if the dead birds had been easier to discover and we could learn their cause of death, I suspect we would have found that relatively few were killed directly by flames. By July, when the wildfires began, few young birds remained in their nests, and most adult birds capable of flight could easily escape. I did find some burned ruffed grouse eggs, and we know that 17 osprey chicks died. Ospreys are among the last birds to fledge in Yellowstone.

I believe that more birds died from indirect effects of the wildfires than from the wildfires themselves. Perhaps the single most important cause of death was asphyxiation by smoke, to which birds are especially vulnerable because they have a fast metabolism. We know smoke inhalation killed one brown creeper. The disorientation and confusion associated with the fire led to deaths from collisions with trees, as we documented for a mallard and a Barrow's goldeneye. Finally, ruffed grouse, great gray and short-eared owls, common ravens, gray jays, and other birds were killed by road traffic after the fire drove them from their home ranges and feeding areas.

But once again, it's important to place the fire deaths in perspective. A survey conducted after the fire ended found that at least 246 elk, two moose, four mule deer, and nine bison were killed by the wildfires. With carrion everywhere, the scavengers had an extended feast. Coyotes, grizzly bears, black bears, and badgers competed for meat with birds large and small.



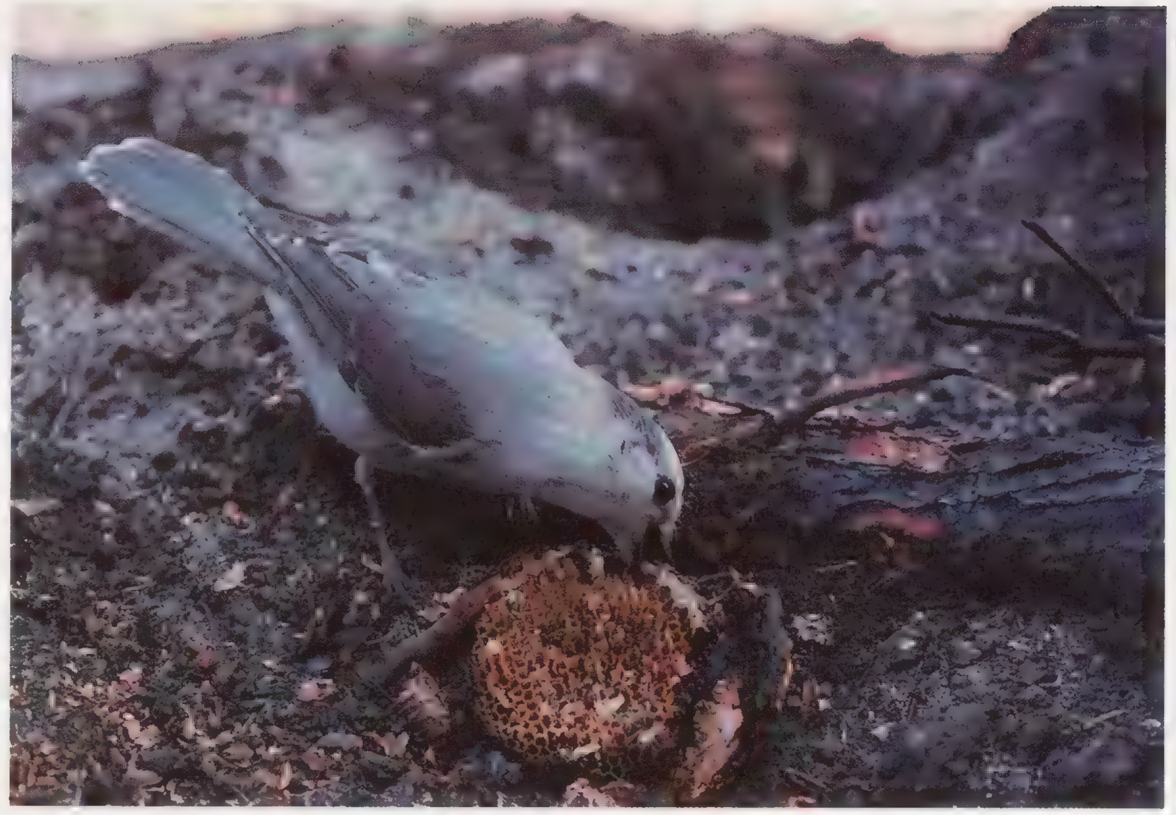
TERRY McENEANEY

MICHAEL S. QUINTON

Left, heartbreakingly blackened corpse of an osprey chick. Few birds actually died in the flames; most documented bird deaths were due to smoke inhalation or collisions with traffic. But ospreys are among the last birds to fledge in Yellowstone, and some young were still in the nest when the fires swept through in July. Below, a nest built the following year atop a charred tree trunk.

In a typical sequence at, say, a bison carcass, common ravens arrive first and peck at vulnerable areas such as the eyes and anus. Ravens play the same role in Yellowstone as vultures do in Africa, leading larger predators to carcasses. In Wyoming, these predators include coyotes and grizzlies. The coyote enlarges the openings begun by the raven. Grizzlies have the power to rip open the tough hide of a bison; they eat their fill but leave plenty for bald eagles, the returning ravens and coyotes, and other scavengers. Within a few

Right: Fires burned away the ground cover over a wasp nest, providing an unexpected bounty for this gray jay. Another bird that will benefit from the fires is the great gray owl, far right, expected to increase in numbers. Seed-filled lodgepole pine cones, below, opened by the heat of the fire.



MICHAEL S. QUINTON

weeks, the carcasses are pretty much consumed.

As this bounty of carrion indicates, the fires' effects continued long after the fires went out. In the same way, the circumstances that led to the fire evolved long before the blaze actually started. One reason the 1988 wildfires were so intense was that flammable fuels—dead trunks and branches, leaves, grasses, needles, and other debris—had built up for many decades. A couple of years of drought made fuels nearly perfect for burning and greatly increased the likelihood that the wildfires, when they came, would be huge.

Due in part to the magnitude of the fires, by spring of 1989 many bird species were doing well. Because of the fire, the severity of the preceding winter, and other factors, many elk and bison died, so scavengers had another bonanza. All scavenging birds were doing remarkably well. Over 80 bald eagles spent the winter after the fires in Yellowstone, the most I've ever seen. Black-billed magpies extended their range in the park.

As for other birds, short- and long-term consequences depend on how the fires affected habitat. As I suggested earlier, I think that few birds were killed directly by flames. The wildfires' major influence was on plants, and the health of various plant communities determines how different birds will fare. The makeup of a plant community results from a complex combination of factors, including the type of vegetation in an area before a fire, the intensity of fire that burned the area, and the daily, seasonal, and long-term time frame one is considering.

Before the wildfires, Yellowstone already contained a great variety of habitats. Vast lodgepole pine forests covered most of the park. Forests dominated by Douglas fir or spruce grew in smaller areas. In moist, shady places, groves of aspen flourished. Meadows were found both above and below the timberline. And then there were variations on each of these habitat types, as well as less extensive habitats such as aquatic communities. Before the fires, then, the park contained a mosaic of different kinds of vegetation, and associated with each plant community was a characteristic array of birds.

Contrary to popular assumption, a forest fire does not move evenly across all types of landscape, nor does it leave behind a uniform barren wasteland. The fire's effects vary not only with the nature of the habitat, but with the intensity of the burn. At night, winds usually decrease and humidity increases. Night fires may burn slowly and erratically, killing some plants but bypassing others. Under different circumstances, fires may move quickly along the ground, burning only the surface. On dry, windy days, on the other hand, fire intensity is greater. The fire burns the forest floor more uniformly, and under certain conditions trees can be incinerated from the ground to the topmost branches. Furthermore, many fires do not proceed along a uniform front; they often leave various-sized islands or fingers of greenery in a section that is otherwise burned, or isolated burned sections in an otherwise green area. Thus, in Yellowstone, a diverse mosaic of fire activity was laid over the already complex array of existing habitats. As a result habitats are even more diverse than before.

The spring following the 1988 wildfires, many grasses, forbs (low-growing, broad-leaved plants), and shrubs sent up new shoots from roots not injured by fire. Seeds blew into the blackened areas and, over time, began germinating. The new growth was unusually lush and green, due in part to the recycling capacity of fire, which transforms trees and other organic matter into ash, a good fertilizer. Where once there were widely spaced mature trees, there will eventually be thick concentrations of tree seedlings.

Over the next few decades, more of the park will grow into young forests and meadows, and meadows will be more open than before. Aspen forests will

TOM AND PAT LEESON

By spring of 1989, many bird species were doing well. In the years to come, the number and diversity of birds in the park should increase.

THOMAS D. MANGELSEN

ROBERT VILLANI

MICHAEL S. QUINTON (2)

Fire transforms trees into fertilizer. In the spring after the fires, grass was unusually lush and green, wildflowers burgeoned.

After an intense burn, the northern flicker, left, finds ants more accessible on barren ground. Blue grouse, below left, feeds on new spring growth. Far left, meadow flowers: hot pink fireweed, which is a favorite of hummingbirds, mingles with purple aster.

probably cover a larger area, though still only a small portion of the park. There will be less sagebrush for several years. Nonwoody plants will continue to be more luxuriant for at least a generation.

What does this all mean for birds? The fire reduced the extent of the old-growth conifer stands that took hundreds of years to develop. The few species that need extensive tracts of unbroken mature forest—species such as the boreal owl and Williamson's sapsucker—will be less common until forests reestablish themselves. Also, without plants to knit the soil together, spring floods may wash sediments into streams. This could kill fish and invertebrates in the smallest streams, making it more difficult for American dippers to find food. Large rivers, however, can accommodate the extra sediment and should be unaffected.

Overall, the number and diversity of birds in Yellowstone should increase. Burned trees will be abundant for many years; already ospreys are doing well because they have plenty of snags for nesting. Cavity-nesting birds such as tree swallows and hairy woodpeckers should face no shortages of suitable nest sites. There will be more mountain bluebirds, blue grouse, and other birds that prefer open habitat to a closed-canopy forest. Trumpeter swans and similar waterfowl should benefit from the concentration of nutrients in lakes, which will produce a strong growth of aquatic plants and invertebrates.

The burgeoning crop of wildflowers has increased hummingbird numbers; sitting in a field of fireweed one day, I was surrounded by 30 of them, hovering like tiny helicopters over the pinkish-purple flowers. Breathtaking. I saw, too, a normally brown vesper sparrow dusted yellow-green with fireweed pollen.

Stands of burned trees may look desolate, but they swarm with insects. Where fire intensities were low, bark-chipping woodpeckers such as the three-toed and the black-backed have easy pickings. Since trees in such areas are not burned much above ground level, the food supply for yellow-rumped warblers and other birds that forage in the canopy is not greatly affected.

Where trees were burned at higher intensities, however, the bark drops off. Insects, deprived of hiding places, grow more scarce. In these areas there is little to attract the three-toed and black-backed woodpeckers, but the hairy woodpecker can drill after insects into the bare trunk. Since plants take longer to reestablish in such areas, northern flickers gathering ants and American robins seeking worms find their prey more accessible.

That the plants and wildlife of Yellowstone can adapt so readily to the wildfire's effects confirms that fire is a natural part of the park's ecology: the ecosystem as a whole has adapted itself to wildfire and indeed could not maintain its diversity without it. Nature is dynamic, and fire is just one of the many processes that constantly interact to produce the habitats that, ironically, many of us perceive as static. So the ecological circumstances of the wildfires do not fit a simple black-and-white scenario of "death" and "rebirth"—both go on all the time. Just as the wildfires of 1988 superimposed a new mosaic of habitat types on the old one, the current burst of growth will not continue forever. The present array of different-aged stands will gradually mature, until a new natural event changes the plant and bird life and the cycle begins again. □

Terry McEneaney is the staff ornithologist for Yellowstone National Park.

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JAILBIRDS

Text and Photographs by Marie Read

The term "confinement" refers to birth as well as to prison. For the female red-billed hornbill incubating her clutch in a hollow tree on the African plains, it means both.

It's enough to make a mother weep. Imagine being imprisoned with a horde of hungry children in a small cell with one tiny window, never setting foot outside until they are nearly grown. Yet for the female red-billed hornbill, a crow-sized bird found in dry bush habitat throughout eastern and southern Africa, it's a scenario that occurs every year of breeding life. The 45 species of hornbills, found in Africa and Asia, nest exclusively in cavities. All but two species take this behavior one step further, however. The red-billed hornbill female, for example, seals herself inside the nest cavity during incubation and most if not all of the nestling period.

I first met the red-billed hornbill while I was in Kenya as part of a research team studying the behavior of a different bird species. En route to Samburu Game Reserve, just north of the equator, I was relieved to see that long-awaited rains had quelled the dust of the normally harsh, dry landscape. When I arrived on New Year's Day, the Uaso Nyiro River was living up to its local name, "brown water." Usually just a trickle in the dry season, it was now a silt-filled torrent. The rains had improved life for the abundant game: antelope and elephant had less distance to travel to find drinking water. Plants, too, had been rejuvenated. The thorny acacia trees that dominate the scrubby vegetation in Samburu were covered with tiny fresh green leaves and buds that would soon open into fuzzy yellow flowers.

All around me the air was alive with the calls of courting birds. In temperate zones, bird breeding is thought to be stimulated by spring's lengthening days. In the tropics, however, the number of hours of daylight remains fairly constant year round, so breeding activities of red-billed hornbills and many other tropical birds are triggered by the rainy season. Only after

DAN POLIN

The imprisoned female and her nestlings rely on the male for all their food. To show that he will be a good provider, the male hornbill, above, presents tasty insect morsels to his mate in a courtship display. Right, a male brings home the bacon. On the carry-out menu at this nest were grasshoppers, caterpillars, crickets, and other insects.

a substantial period of adequate rainfall is enough food available for the female hornbill to produce eggs.

At noon I parked my car under a large, shady tree not far from the river bank and relaxed with a cool drink to wait out the equatorial heat. Even in the rainy season, mornings are often clear and sunny, with midday temperatures reaching 85 degrees in the shade. Drowsily I noticed two red-billed hornbills in a nearby tree. My thoughts of a snooze disappeared when I realized one bird was flying back and forth from the river bank with clumps of mud in its bill. What luck! I had come upon a mated pair preparing their nest site for breeding.

The hollow tree they had chosen had one main entrance hole about 10 feet above ground level and several smaller openings higher up the trunk. This was a typical choice; the birds prefer a nest cavity that has an extensive hollow chimney above it, into which the nest inmates may escape if danger threatens. To and fro flew the female hornbill, packing the sticky mud into each upper hole, working hard to get it completely sealed. Overwhelmed by all this energetic activity on such a hot day, I just sat and watched.

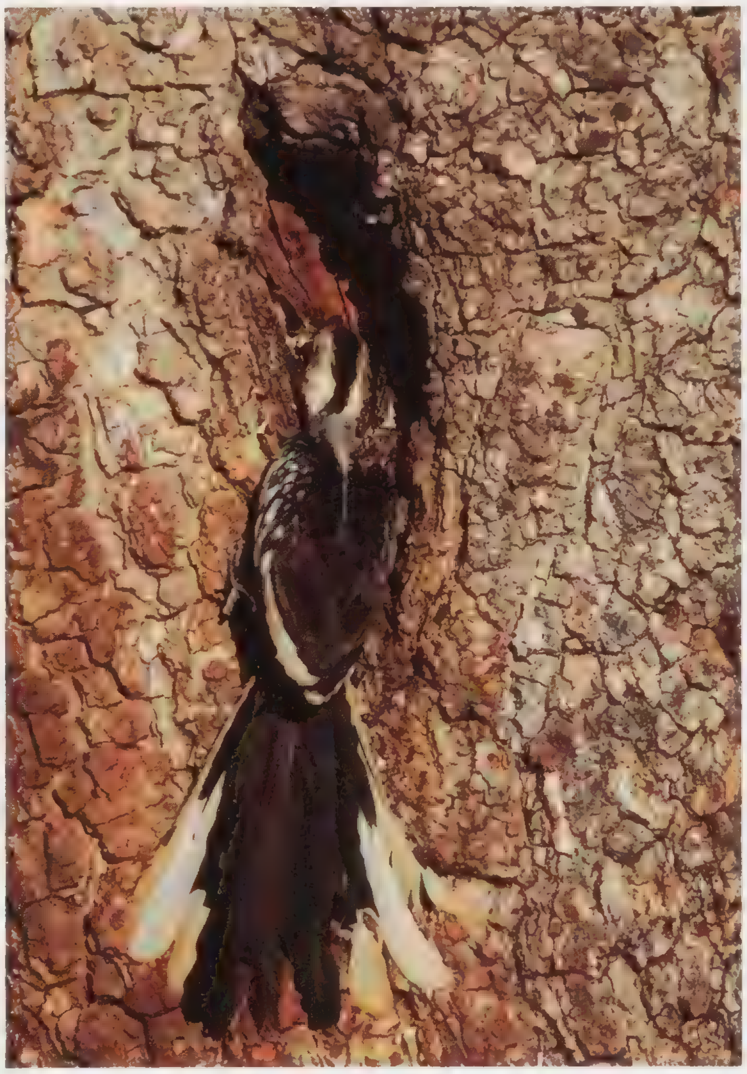
In a couple of days the female red-bill would start to seal up the main entrance of the nest hole in a similar manner. Using the flat sides of her bill, she pats the still-moist mud against the edge of the entrance, gradually building up smooth layers, which dry rock-hard in the arid climate. Meanwhile, the male brings nest-lining material — dry grass, leaves, or bark fragments — to the female but takes no part in the sealing activities.

When the nest entrance has been narrowed so that the female can barely squeeze in, she enters for the last time and continues to seal from the inside using her own droppings. Finally, after a few hours, only a narrow vertical slit remains. This provides the female's sole view of the world for the next month and a half.

The male is left with the responsibility of providing all the female's food. Red-bills tend to remain paired to the same mate for successive seasons, so a female usually knows that her mate is trustworthy. Even so, she doesn't begin a new term of such dependence without some additional mate quality control. This was clear later in the afternoon as I watched a pair performing their territorial display on a low branch. With wings slightly spread and necks arched, the birds bobbed up and down giving rhythmic clucking calls. Several times the male interrupted the ritual when he flew down to the ground to pick up a tasty insect morsel, which he presented to the female. This courtship feeding is typical prebreeding behavior and may be the male's way to show his mate how good a provider he will be in the future. Indeed, as breeding approaches, the male brings more and more of his mate's daily allotment of insects. By the time the female has finally sealed herself into the nest, she already relies completely on the male.

While imprisoned in the nest hole laying her eggs, the female undergoes her annual molt, losing all her wing and tail feathers simultaneously. By the time the clutch is complete, she would be incapable of flight even if she were free.

Although they have few natural predators, red-bills are occasionally killed by birds of prey. What would happen if the male died during his mate's confinement? Certainly the female could break out of the nest and feed herself if necessary, but she would be much more vulnerable to predation in her flightless state. In evolutionary terms the timing of her molt makes sense: she gets both incubating and molting over at once in



a secure place. In contrast, because the male must remain active, he molts much more gradually.

Early the next morning I was watching giraffes drinking at a water hole when a hornbill flew past carrying a large insect. My birding reflexes took over and I followed it with my binoculars until it landed in a nearby tree. After a few seconds it flew down behind the trunk, then reappeared empty-billed: another hornbill nest!

Cautiously I moved my car closer until I could see the nest entrance. Ten minutes later the male hornbill arrived with a grasshopper in his bill and presented it at the vertical slit in the sealed entrance. Instantly another dark red bill jabbed through the slit, seized the food, and pulled it inside with a squawk. Off flew the male on another foraging trip.

Suddenly I heard vocalizations which could only be the chicks. Red-billed hornbills lay from two to five white eggs that hatch after about 24 days of incubation, after which the male must bring food for the young as well as his mate. On the menu at this nest were crickets, grasshoppers, maggots, caterpillars, and once a pale mantis that was almost too large to fit through the entrance slit. This caused a great commotion, the inmates raucously begging and fighting over who should get the prize.

Between the feedings the imprisoned birds impatiently thrust their bills and feet out of the entrance slit. I caught glimpses of their black-and-white plumage as they jostled each other for the chance to sit at the narrow window and peer out with one eye for father approaching with the next meal. Occasionally debris was tossed out of the hole. Hornbills keep their nests very clean, even defecating through the entrance slit to avoid soiling the nest interior.

With the young so active, I guessed that before long the female would break out of the nest. This usually takes place when the brood is half grown, about 21 days old. It's no easy task — several hours of repeated chipping at the hard sealing material may be needed before she has made a hole large enough to squeeze through. The young birds immediately reseal the entrance with their droppings. With her flight feathers regrown and showing no ill effects from her long imprisonment, the female begins to help the male feed the growing fledglings until they too are large enough to break out of the nest.

Why did the hornbills' sealed-in nesting method evolve? What is its function? I got a hint of an answer to these questions when the leaves high above the nest began to rustle, and down the trunk of the tree climbed a vervet, an agile monkey that is a renowned nest robber. All at once, the male hornbill began to give staccato alarm calls and the begging birds inside the nest suddenly became silent. While vervets are as nimble-fingered as any monkey, their hands lack the strength to break the hard sealing material that protects nesting hornbills. This one peered into the nest entrance briefly, then continued on its way. Maybe it would find a more accessible nest, perhaps that of a woodpecker. Other nest predators, such as snakes and mongooses, would be even less likely to find an easy meal at a hornbill nest.

The cementlike seal that blocks the entrance to the nesting cavity foils would-be predators such as this agile vervet monkey, left. The hornbills' unusual nesting habits are effective: in one study, only a single nest out of 150 experienced predation — after an elephant damaged the tree.

Although we can only speculate, the hornbills' unique nesting habits most likely evolved in response to predation. And the behavior is highly successful. In the late 1960s Dr. Alan Kemp studied the red-billed hornbill and two closely related species in South Africa. During four years of research he noted nest predation only once in nearly 150 observed nests, and in that single instance the hornbill had been exposed when elephants damaged the nest tree. In such cases, the typical hollow chimney above the nest cavity may give additional protection. If a predator gains access through an entrance seal broken because of tree damage, the female and her young might climb up the chimney out of reach.

As I left the red-billed hornbill family safe in their nursery stronghold, I could not help but wonder by what mechanism their bizarre behavior had arisen. How did the ancestor of today's hornbills start blocking up tree holes? Through what intermediate stages did the modern behavior develop from the original occurrence? Behavior leaves no fossil record, so the answer will never be known. We can but marvel at this unique sealed-in nesting behavior, a phenomenon that compels some ornithologists to consider hornbills the most highly evolved of hole-nesting birds. ☐

Marie Read avoided North American winters for five years while studying avian social behavior in Kenya, East Africa. Now a wildlife photographer and writer, Marie makes her home near Ithaca, New York.

Further Reading

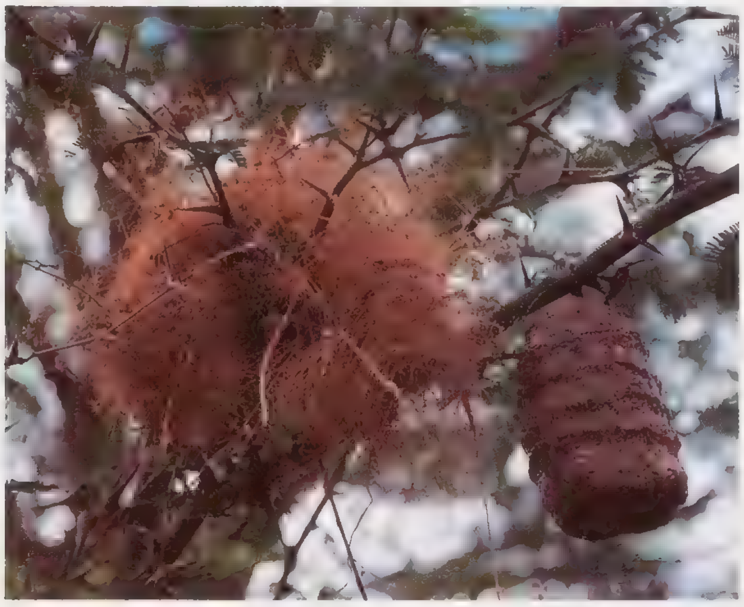
Brown, Leslie H., Emil K. Urban, and Kenneth Newman, eds. *The Birds of Africa.* New York: Academic Press, 1982.

BIRD SCIENCE ON THE WING: THE LATEST IN ORNITHOLOGY

It flourishes in field and laboratory, in universities, museums, and government offices with the word "wildlife" in their names—the study of birds, ornithology. And studied birds are, and surveyed, monitored, quantified, analyzed, and reviewed.

Most researchers in the vanguard marching the science forward belong to the AOU—American Ornithologists' Union—the professional society. It has convened each year for the past 107, and at that first meeting the seekers and finders presented hypotheses and discoveries to their peers. The tradition continues.

The latest gathering, which was attended by us eager Lab scientists and editors, was held last summer in Pittsburgh. What's new in ornithology? Below, a sample drawn from the 236 papers given by the assembled scientists and summarized by our own Cynthia Berger. Today's ornithology—part muddy boots and pencil scratchings, part hard disks and print-outs—spans research topics from spinning phalaropes to "dummy" nests, from cuckolded starlings to woodpecker defense strategies.


FRANK JOYCE

KATY VAN DUSEN

Wasp Nests Are Best

FRANK JOYCE

Some tropical birds build their nests close to the nests of ants and wasps. Do the birds benefit from their unusual neighbors? Scientists have proposed that the stinging insects might deter some predators. But concrete evidence that birds nest near ants and wasps by choice, not chance, has been lacking. As part of his doctoral research, Frank Joyce of Cornell University chose to fill this information gap. In Costa Rica's Santa Rosa National Park, he studied the nest-site preferences of three species: the yellow-olive flycatcher, banded wren, and rufous-naped wren.

Joyce followed the birds to their nests and noted the species of nest tree chosen as well as the surrounding vegetation. He found that ant-acacia trees—which have large thorns that house colonies of aggressive ants—were used as nest sites more often than mere chance would predict.

To test whether birds also deliberately choose to nest near wasps, Joyce crafted papier-mâché models that mimicked wasp nests. He installed 33 of the imitation wasp nests in a set of randomly chosen ant-acacia trees within the territories of courting birds. Thus birds had a choice: ant-acacia trees with wasp nests or control ant-acacias with no wasp nests. Birds showed a significant preference for the trees that sported artificial nests.

While conducting other research, Joyce had noticed that the birds seemed to prefer larger wasp nests to smaller ones. To test his hunch, he hung both large and small nests in 29 banded wren territories, placing the fakes both in ant-acacia trees and in other species of trees that were ant-free. In this controlled experiment the wrens didn't show a clear preference for large wasp nests. They did, however, consistently prefer to nest near artificial wasp nests and in ant-acacia trees, a result that agreed with Joyce's earlier experiments.

ROBERT JEDAS

Tempest in a Teacup: Spinning in Phalaropes

BRYAN OBST

Phalaropes are small sandpipers with a distinctive foraging behavior: they spin like tops, twirling rapidly in the water to create small whirlpools that lift pieces of food off the bottom and concentrate them within easy reach.

Red-necked phalaropes ordinarily breed on tundra ponds, wintering on the open ocean. Bryan Obst of UCLA discovered that the birds will also spin in an ordinary glass aquarium, and seized the chance to study several aspects of spinning.

Obst captured phalaropes at Mono Lake, California, and trained them to feed on frozen brine shrimp in a tank one meter square. He then filmed the spinning birds at about one-twelfth normal speed. Played back, the slow-motion films showed how spinning happens. As the legs alternate kicks, the outer leg sweeps through a wider arc than the inner leg. A phalarope typically makes one revolution per second, and each revolution takes seven or eight kicks. While the bird's body circles smoothly, its head moves in discrete 45-degree "snaps," much like a well-trained ballerina.

Next Obst wanted to observe and describe the movement of the water during a spin. He added dye to the water and traced its path, and also tracked individual brine shrimp, using side and overhead video cameras. Obst found that a spinning phalarope kicks up a column of rising water with shrimp gathered in the center like tea leaves in a quickly stirred cup. This pattern of circulation, called meridional flow, shapes other natural phenomena such as whirlpools, tornadoes, and hurricanes.

Finally, to measure the physiological cost of spinning, Obst trained the phalaropes to swim in sophisticated chambers that measured the level of metabolic activity while birds were spinning or swimming at different speeds. A spinning phalarope's metabolic rate turns out to be very high — the experiments showed that gathering food by spinning burns up about twice as much energy as foraging while swimming. Obst suggests that phalaropes spin only when the tactic will net more food than would normal swimming, and plans experiments to test this hypothesis.

L. PAGE BROWN

Don't Be Fooled by Dummy Nests

STANLEY TEMPLE

To measure how often predators launch raids on bird nests, ornithologists often construct "dummy" nests and stock them with chicken or quail eggs. Researchers prefer to use the fakes because finding enough real nests, hidden in dense forest or tangled grassland, for an adequate experimental sample is a time-consuming and labor-intensive job.

But when Stanley Temple of the University of Wisconsin reviewed the results of his long-term study comparing predation on natural and dummy nests, he found that dummy nests experience much less predation, probably because fewer egg-eaters find them. Avian predators such as crows can find dummy and natural nests equally well because they rely only on their sense of vision, but mammalian predators — raccoons and squirrels, for instance — follow bird sounds and scents and so are less likely to detect the uninhabited dummies.

In one recent study using dummy nests, researchers in New Hampshire reported that rates of predation were almost identical in two study sites: one where red squirrels and eastern chipmunks were present and another where these egg-loving mammals had been removed. The authors of the study explained that, even when squirrels were removed, seven other predator species still scouted both sites. Temple points out that squirrels and chipmunks, which rely more on scent than sight, wouldn't be expected to prey on dummy nests, so it's not surprising that their eviction had little effect on predation rates.

JOHN CANCALOSI

Do Bowerbirds Pay to Display?

GERALD BORGIA

In the rainforests of Australia, male satin bowerbirds construct elaborate platforms, decorate them with flowers and ornaments, and use the structures, called bowers, as a stage from which to court females. Biologists from Charles Darwin on have wondered how a behavior that seems to put the male at a disadvantage could have evolved; bower building consumes time and energy that could be spent foraging, and the conspicuous structures and courtship displays might attract predators.

To measure whether bower building actually exacts a high cost, Gerry Borgia traveled from the University of Maryland to New South Wales, Australia. The researcher and his assistants color-banded and released bower-building males and watched the birds at their bowers and feeding sites from 1980 to 1988.

Borgia reasoned that if the bower and the courtship displays make a male vulnerable to predation, then more bower-building males would die during the mating season than during other seasons. He also predicted that the group of males with the most elaborate bowers should have the highest mortality rate.

To measure mortality, Borgia relied on the fact that males construct bowers in the same location year after year. Therefore, males that didn't return to their sites could be presumed dead. He found that, contrary to his predictions, the mortality rate was the same every month whether or not a male was maintaining a bower. In fact, the males with the most elaborate bowers lived the longest.

Borgia also left stacks of decorations near bowers. If males invest time and energy in collecting ornaments, he argued, then the birds that were offered free decorations should snap them up. But surprisingly, the males with easy access to ornaments actually used fewer of them than the males that collected their own. And following a period of drought and extreme cold, males that tried to maintain bowers lost no more weight than the birds that didn't build a bower that season — evidence that bower building doesn't burn up many extra calories. Borgia's experiments suggest that bower building and maintenance aren't as energy costly as they seem.

DAVID BAY

House Finch Females Favor Flashy Feathers

GEOFFREY HILL

Male house finches vary in color from pale yellow to bright red. Geoffrey Hill, a graduate student at the University of Michigan's Museum of Zoology, conducted laboratory and field studies to test whether the female chooses a mate by the color of his plumage.

In the laboratory, female finches were placed in a specially designed chamber with a view of four different males. After an initial adjustment period, females moved around the chamber, visiting the four males in spurts of activity. Typically a female perched near one male for several minutes, then moved on to the next male.

Interactions among the birds were intense, with males courting vigorously and females posturing to preferred males. The female repeated her behavior pattern — searching and then associating with one bird—until the end of the trial. Hill determined that female finches significantly preferred the most colorful male, regardless of his size, his social status, or the amount of singing he did.

Observations of finches in the wild corroborated the laboratory study. Hill captured and banded 149 male house finches, noting the plumage color before releasing each bird. He later compared the average coloration of all the banded males to the color of those banded birds who later were seen with a mate. The mated males as a group were much more colorful than the original random sample of banded birds.

Hill's observations fit what scientists call the "honest advertisement" model of sexual selection. The quality of a male house finch's diet directly affects the color of his feathers. Food that is rich in carotenoids—the pigments that give carrots and autumn leaves their color — makes plumage bright. By selecting vividly colored males, females choose mates who are well fed and in good condition.

RICK SCHAEFER

Rat Snakes Keep Out!

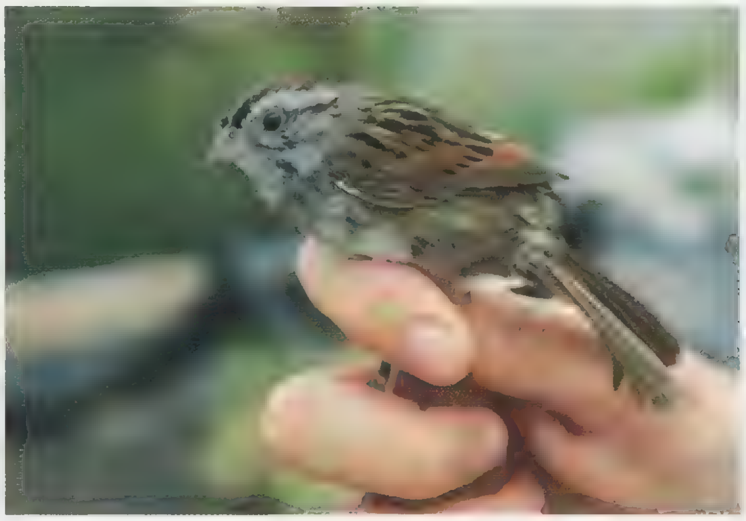
D. CRAIG RUDOLPH, HOWARD KYLE, AND RICHARD N. CONNER

The endangered red-cockaded woodpecker shares its preferred habitat, mature pine forests of the southeastern United States, with a notorious egg predator, the black rat snake. Although the snake climbs most trees with ease, anecdotal evidence suggests it rarely takes eggs from red-cockaded nest cavities. D. Craig Rudolph and Richard Conner, researchers with the USDA Forest Service, and collaborator Howard Kyle explored the possibility that the woodpeckers were foiling the snakes by modifying the nest trees. Red-cockadeds scale away loose chunks of tree bark and also drill holes which ooze sticky resin that coats the trunk.

The researchers captured nine rat snakes ranging in size from 2 to 6 feet and tested how quickly they could climb normal, scaled, and resin-coated trees. On scaled and normal trees, snakes climbed the entire five-yard test course in 62 out of 63 attempts. In 18 attempts on resined trees, however, snakes completed only three successful climbs, and these were made by the two smallest snakes. In general, small snakes also climbed scaled trees much faster than did large snakes. Why are small snakes better climbers, and why is resin hard for snakes to climb?

A small snake can worm its way up a tree trunk by insinuating its body into narrow crevices between slabs of bark. Larger snakes can't fit in the crevices and must rely on protruding bark fragments to gain a "toehold." So by removing loose bark, woodpeckers make scaled trees more of a challenge for the big guys. Woodpeckers scale the resined trees, too, and the resin itself fills the narrow bark crevices, so these doubly protected trees discourage snakes of all sizes. The sticky resin also adheres to snakes' scales, interfering with their ability to climb.

Other studies have shown that snakes can climb on dried-out resin. The red-cockaded woodpecker, though, constantly re-excavates the holes that seep resin, promoting copious fresh flows. In addition to excluding snakes, resin may keep out other birds such as bluebirds and starlings that compete for nesting cavities.



RUSSELL GREENBERG

Mysterious Black Swamp Creature

RUSSELL GREENBERG AND SAM DROEGE

A swamp sparrow discovered in eastern Maryland's coastal marshes almost 40 years ago was surprisingly different from most other swamp sparrows. Unlike its rusty-capped, freshwater-breeding, migratory brethren, the new sparrow seemed to be a year-round salt marsh resident. Black feathers replaced some of the rusty markings on the crown and nape, and the bird also had an exceptionally large bill.

Recently, breeding bird atlas projects have turned up more dark-colored swamp sparrow populations in the tidal marshes of the Chesapeake and Delaware bays. These finds spurred Russell Greenberg, National Zoological Park, Washington, D.C., and Sam Droege, U. S. Fish and Wildlife Service, to gather more complete information about this coastal sparrow's distribution, plumage, and other characteristics. The researchers wondered whether the bird might really be a year-round resident, and whether its dark color and large bill were special adaptations to the salt marsh habitat.

Out in the field observing coastal and inland swamp sparrow populations, Greenberg and Droege found that the new coastal subspecies is, in fact, migratory. Swamp sparrows from inland populations overwinter in the marshes, but leave as the coastal subspecies arrives to breed. Earlier observers had not distinguished between the two subspecies.

A large bill and dark coloration have been noted in coastal populations of other birds. For example, coastal subspecies of seaside sparrows, sharp-tailed sparrows, and savannah sparrows also have a comparatively large bill — a feature that may make probing the tidal mud for seafood a little easier. Coastal races of other sparrows, as well as the long-billed marsh wren and such small mammals as shrews and voles, are darker in color than their inland relatives. Perhaps dark colors are harder for predators to see against a background of tidal mud; therefore, a camouflage coat evolved in many different salt marsh dwellers.

BETH HOWARD

Cuckoldry: For Male Starlings It's Worth Brooding About

HARRY W. POWER

Male starlings act as though cuckoldry — insemination of the mate by another male — were a major threat to their reproductive fitness. The male guards his mate from the overtures of other males, and follows her when she flies off the nest to feed, leaving the clutch unprotected. While the pair are afield, another female starling might add her eggs to the nest (an event called brood parasitism) or toss out eggs already laid. The male's willingness to risk brood parasitism and egg removal to prevent cuckoldry suggests that a single cuckolding insemination is more threatening to his reproductive output than the intrusions of a nonmate female.

Until recently, scientists have had difficulty demonstrating the existence of cuckoldry or the frequency with which extra-pair copulations produce fertilized eggs. Then, from 1983 to 1985, Harry Power of Rutgers University and his graduate students conducted a large-scale study to determine the genealogies of 106 complete families of starlings. They identified enzymes in blood and tissue from a total of 550 parents and their offspring. Enzyme structure is an inherited characteristic that can be used to determine whether the incubating pair are the nestling's actual parents.

The study revealed that cuckoldry is uncommon, involving only 2 to 8 percent of all nests. When it does occur, however, it affects several eggs in a clutch, while an invading female generally lays or removes only a single egg. Power's findings suggest that the male starling's strategy of guarding the female is the best course he can take to maximize the number of offspring he fathers.

MONICA HURT

(How Do Birds Know If) He's Playing Their Song

D. M. WEARY

Bird sounds are packed with information. Each song or call tells other birds about the singer's identity, physical fitness, and desire to mate. Researchers have developed schemes for classifying bird songs, but the relevance of these schemes to birds in nature depends on whether birds and humans fit songs into the same categories.

Dan Weary, a researcher at McGill University in Montreal, conducted laboratory studies using wild-caught great tits to investigate how birds categorize the songs they hear. First, he trained caged birds to discriminate between two computer-generated "training songs." Birds learned to fly from a perch toward a feeder when they heard one training song and to stay on the perch for the other song. Weary called these "GO" and "NO GO" responses, respectively.

The training songs were modeled after naturally produced great tit song notes but differed from each other in five ways. The "GO" song was of high frequency and amplitude and long duration, with rapid amplitude and frequency modulation. The "NO GO" song was just the opposite: low frequency and amplitude, short duration, and unmodulated. The training continued until birds could correctly discriminate between the two songs 80 percent of the time.

Weary then prepared 30 test songs comprising all possible combinations of the five qualities. For example, compared to the "GO" song, one test song was the same in all ways except that it was of short duration.

The researcher found that birds gave a "GO" response to test songs with high frequency notes, regardless of whether the other parameters of the song were high or low. This result suggests that frequency is the feature great tits use to categorize song notes.

The actual difference in frequency between the "GO" and "NO GO" training songs was small compared to such qualities as duration and amplitude. Why didn't the birds use a song feature with greater variation as a cue? The answer may be that birds are extremely sensitive to changes in frequency; in fact, other studies have shown that birds can detect a change as small as 1 percent.

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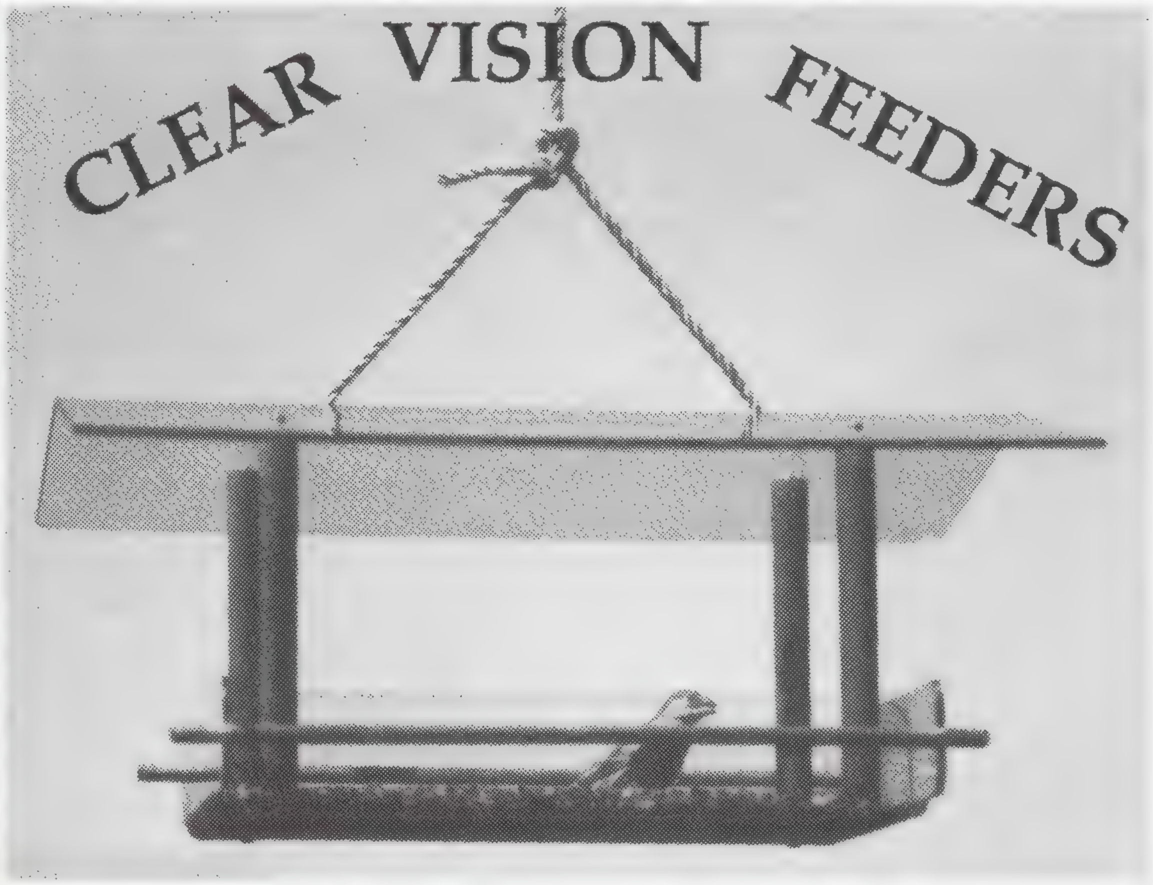

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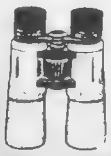

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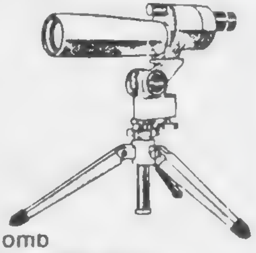

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ARTHUR MORRIS

THE REFUGE THAT DING BUILT

Alvah Sanborn

It has been said that if God retired, he would move to Sanibel Island, Florida, site of the J. N. "Ding" Darling National Wildlife Refuge. Roger Tory Peterson has called the refuge the best place in North America to photograph birds, observing that its undiminished bird populations have lost some of their fear of humans. Located on the western shore of Sanibel off Florida's west coast, the refuge takes its name from Jay Norwood Darling, a nationally known political cartoonist and a founder of the conservation movement in the United States.

How did a newspaper cartoonist come to have a Florida wildlife refuge named after him? In the 1930s and 1940s, a cartoonist could exercise a lot of political clout. For over 40 years, Darling drew political cartoons for the Des Moines, Iowa, *Register*, signing them "D'ing." More important, his cartoons, often on conservation themes, became front-page material for the New York *Herald Tribune* and were syndicated in 130 newspapers from coast to coast. In 1934, he was chosen "Best Cartoonist" by newspaper editors from around the country. He twice received the Pulitzer Prize.

Darling was involved in the beginnings of the conservation movement in the first few decades of this century. He helped organize the Iowa branch of the Izaak Walton League, a conservation group, which pushed through legislation creating the Iowa State Fish and Game Commission. In 1931, he himself was appointed to the commission. He immediately demonstrated his flair for innovative approaches to wildlife problems by forming the country's first cooperative research unit, a three-year arrangement consisting of Iowa State College, the Iowa State Fish and Game Commission, and himself. Always one to put his money where his mouth was, he gave $3,000 yearly to the project.

Franklin Roosevelt soon appointed Darling to a special commission to study the country's migratory waterfowl problems, and in 1934 chose him to head the U.S. Biological Survey, forerunner of the U.S. Fish and Wildlife Service. As director of the survey, Darling's use of innovation continued. He led the drive to establish the national wildlife refuge system, which today includes over 400 refuges embracing more than 88 million acres. To help pay for the refuges, he initiated the very successful duck stamp program, which requires that every hunter buy a migratory bird hunting stamp. The proceeds have been used to purchase wetlands for 186 refuges.

Darling first visited Sanibel in 1935. He considered the islands idyllic, and built a winter home on nearby Captiva Island in 1942. His home, Fish House, was built over the water; he raised the drawbridge when he needed privacy to work on his cartoons.

Darling quickly became a champion of the islands' conservationists. He had all the right qualities. His enthusiasm was infectious. He was articulate and witty. What's more, he could deliver a knockout punch with a clever cartoon. His influence is still felt here on Sanibel even though he died in 1962, at the age of 86. He inspired people to action.

Mainly as a result of Darling's efforts, the Florida legislature in 1939 made Sanibel, Captiva, and the surrounding waters a state wildlife refuge. In 1945 this status was superseded when 5,014 acres were set aside as the Sanibel National Wildlife Refuge. The refuge has been expanded gradually, and today it includes other small, noncontiguous properties both on and off the island. It was renamed the J. N. "Ding" Darling National Wildlife Refuge in 1967.

The focus of the refuge is the five-mile-long wildlife drive which cuts through a mangrove forest surrounded by open waters that are themselves dotted with mangrove islands. The drive originated, not as a convenience for bird watchers, but as a broad dike to impound waters for mosquito control. In the '30s, after 400,000 mosquitoes were caught in one night in a light trap, Sanibel became known as the mosquito capital of the world; it was said that you could swing a pint cup and catch a quart of mosquitoes. The purpose of the dike was to impound water on the tidal flats and cover the exposed mud on which salt marsh mosquitoes lay their eggs. The dike also permits water levels to be raised and lowered to benefit birds, as in the spring when the level is dropped to give migratory shorebirds ready access to food on the exposed mudflats.

My first visit to Sanibel and the refuge was in 1970 when I was on tour as a National Audubon Society wildlife lecturer. I have two vivid memories of that visit. I was impressed with the great number of birds — the shores of the impoundments were lined with waders, loafing and preening coot, blue- and green-winged teal, and even beautiful shovelers. I was particularly delighted that with a good telephoto lens I could get frame-filling pictures from the car window.

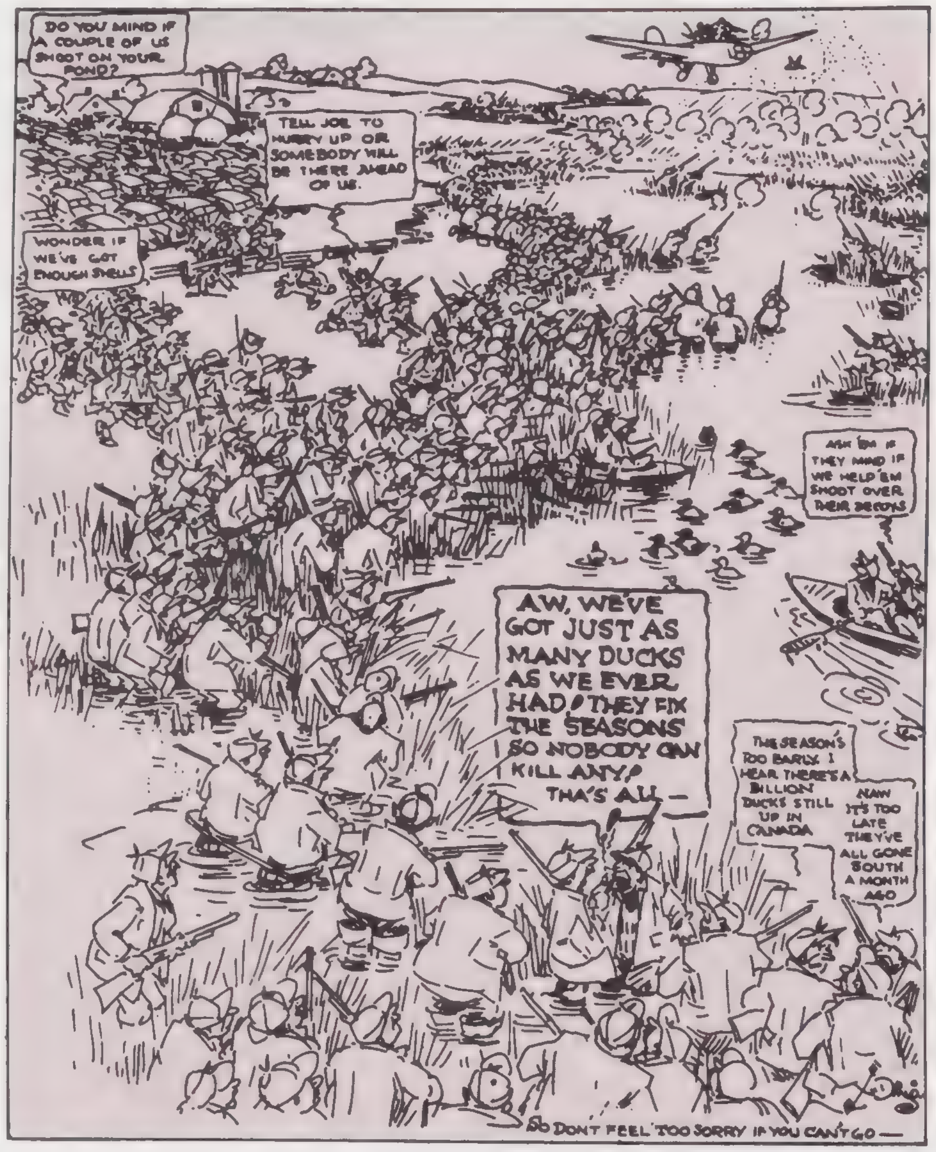
The other experience occurred one day as I drove along the edge of the narrow ditch beside the wildlife drive. I saw eight or ten female and immature red-breasted mergansers swimming along two to four abreast, herding fish before them. Suddenly they charged and dove this way and that, occasionally surfacing with a fish in their "toothed" jaws. The banks quickly filled with egrets, white ibises, and little blue and tricolored herons eager to cash in on the moment of plenty. At the dead end of the ditch, they joined in a wild feeding frenzy. Mergansers excitedly plunged under the surface, sending up small water spouts. Herons and egrets ran along the edge jabbing away. A snowy flew across with feet trailing, reaching down to snatch a fish from the surface. Fish died by the dozens, but plenty doubled back and eluded their pursuers. In a few minutes it was over. The herons flew off to look for better hunting, and the flotilla of mergansers steamed sedately back up the ditch.

A few years later I retired and my wife and I bought a place on Sanibel. Now I am a refuge volunteer apt to be out on the wildlife drive three or four times a week. It's important for me to be out on the dike early in the day when the birds are busy feeding after a night of fasting. Also, the more hours you spend in the field, the more likely you are to have a choice encounter. Friends of mine have seen such dramatic events as a great blue heron spearing and subduing a thrashing water snake, a bald eagle attacking an anhinga, and an alligator seizing a great egret.

One beautiful morning I came upon a small group of photographers with whom I

UPI/BETTMAN NEWSPHOTOS

Cartoonist and conservationist Jay "Ding" Darling, above with his son, championed the effort in the '30s to create the Florida wildlife refuge that Roger Tory Peterson has called the best place in North America to photograph birds.


DO YOU MIND IF A COUPLE OF US SHOOT ON YOUR POND?
TELL JOE TO HURRY UP OR SOMEBODY WILL BE THERE AHEAD OF US.
WONDER IF WE'VE GOT ENOUGH SHELLS
ASK 'EM IF THEY MIND IF WE HELP 'EM SHOOT OVER THEIR DECOYS
AW, WE'VE GOT JUST AS MANY DUCKS AS WE EVER HAD! THEY FIX THE SEASONS SO NOBODY CAN KILL ANY! THA'S ALL —
THE SEASON'S TOO EARLY. I HEAR THERE'S A BILLION DUCKS STILL UP IN CANADA
NAW IT'S TOO LATE THEY'VE ALL GONE SOUTH A MONTH AGO
SO DON'T FEEL TOO SORRY IF YOU CAN'T GO —
Ding

Copyright 1990, *Des Moines Register and Tribune Company* enjoy shooting. They had spotted a green-backed heron across a ditch in the mangroves not more than fifteen feet away, stationed on an outthrust branch a foot above the water. The green-back is a master of waiting for its quarry to come within range of a strike. Quickly I mounted my camera on the tripod and set up on the bird.

As I watched, he crouched ever so slightly. His yellow iris shone in the sunlight. Very slowly, almost imperceptibly, his head moved toward the water. He tensed up. I tensed up. So did the others. Then a gust of wind, not much, but enough to make him bob up and down a bit, destroyed his concentration. He pulled back, relaxed, and began to preen, as if to say, "I didn't want him anyway." Unbelievably, while reaching back to his preen gland, he almost lost his balance and only recovered by a dexterous flip of the wings.

A shadow crossed brightly lighted green leaves as several turkey vultures circled very low overhead. An immature tricolored heron worked the shoreline nearby. He darted out here and there and caught some tiny fry. Presently he worked his way to within three feet of me, and then he stepped around my tripod leg as if I wasn't there.

Suddenly the green-back's mood changed—he was all business again. For bird and photographers, the tense wait resumed. Slowly, ever so slowly, he stretched his head and neck toward the water. After a wait that seemed like hours he suddenly hurled his javelin, stretching his neck, body, even his legs to the fullest extent, like an acrobat. In one lightning movement he caught the fish. His momentum was so great that he bounced back in one yo-yo-like swoop. With a gulp he swallowed the fish. A couple of hard swallows and he was ready for more. Patience had been rewarded.

Among the winter residents we often have two or more reddish egrets. Relatively rare, they can be readily identified by their shaggy, reddish heads and necks. Watch one gallop along with wings partially opened to give him balance as he turns and twists. He moves in for a kill—see him lean way off to one side to cut the glare. But it is no go. He stops abruptly, turns, and with head raised high dashes off on a zigzag course. Suddenly he stops and spreads his wings. Canopying, it is called. Why does he do it? To cut the glare, or perhaps because the fish will run into the shade he creates? No matter. One jab and he has his reward—a flapping minnow.

The last quarter-mile of the wildlife drive, known as Alligator Curve, runs along a ditch with mangroves growing over the water. Anhingas nest here, and it is a perfect place to watch them pursue their prey, swimming underwater between the prop roots of the mangroves and among the water weeds. They seize tiny fish between their mandibles, but they impale larger ones, toss them into the air, catch them, and swallow them head first. What timing! A large fish goes down like an orange in a Christmas stocking. Now we know why they are sometimes called snake birds. Moorhens live here, too, in company with green-backed herons. Alligators nest on the banks and the females and their broods often bask on the sunny shores.

The "Ding" Darling refuge offers a different kind of experience to the east of the wildlife drive, on Tarpon Bay. If you're the adventurous type and want to get your blood stirring, try the Commodore Creek canoe trail, which runs among the mangrove islands of the bay.

Trying to find your way through Florida's mangrove swamps can be confusing and even dangerous, but here the way is clearly marked. The trail weaves among the arching

The green-backed heron, below, master stalker of fish. The shores of the impoundments at the Ding Darling Wildlife Refuge are lined with wading birds such as the snowy egret, above right. Below right, anhinga in characteristic snake-necked pose.

DARRELL GULIN

prop roots of mangroves through a watery tunnel in the forest. Here you see agile, almost black mangrove crabs climbing about like squirrels. If you try to catch one, it vanishes around the back of the trunk. From time to time three or four white ibises fly up with loud nasal honkings. Black-crowned night herons, their heads pulled into their shoulders and their eyes nearly shut, stir uneasily but seem reluctant to get up and away. In the clear tidal waters, schools of mullet dash madly in one direction, then the opposite. Presently, you come to several sizable ponds where you may see roseate spoonbills and an occasional wood stork. It is grand to see these large storks, their black-and-white wings contrasted against blue sky, glide in for a landing. On the pond bottom, hermit crabs in borrowed shell homes, horseshoe crabs of ancient lineage, and king's crowns hardly recognizable as the beauties of the shell cabinet plow their way through the mud. After the heat of the noon sun, it is pleasant to get back into the dark recesses of the mangrove forest where you started.

TIM FITZHARRIS

ROBERT VILLANI

Although the human population of Sanibel continues to grow at a fantastic rate, Ding Darling would be pleased to know that almost half the island is protected in perpetuity by the refuge that bears his name, along with some other conservation lands. Some species, such as the spoonbills, are increasing. He would not find everything to his satisfaction, however. The man who was known as "the best friend the ducks ever had" would be saddened, for example, by the drastic reductions in duck populations both nationally and at the refuge—a result of habitat loss caused by drought and the draining and filling of breeding areas. Fortunately, ducks are a renewable resource, and plans for waterfowl recovery are being implemented. When that occurs, the J. N. "Ding" Darling National Wildlife Refuge will be ready to welcome them. In the meantime, the otters, alligators, pelicans, raptors, and hordes of migrating shorebirds should keep the 800,000 annual human visitors busy. ☐

LEONARD LEE RUE III

In many backyard birds only the female incubates, but a mourning dove pair shares the job, changing places on the nest precisely twice a day.

MOURNING DOVES

Donald and Lillian Stokes

One April morning, as we were getting dressed, we looked out the bedroom window and noticed a mourning dove walking about on the ground under some pines and shrubs. This struck us as odd —all winter we had seen mourning doves only in flocks at our feeders. Why was this bird away from the feeders and alone?

As we watched we realized that it was searching for twigs, which it picked up in its bill, gave a quick shake, and then dropped. After about five tries, it chose a thin, stiff twig about six inches long. The bird then flew into a nearby pine tree and we lost sight of it.

Even though mourning doves are common, we were thrilled to think we might have a pair nesting in our yard. We finished dressing, got our binoculars, and headed outside. By this time the mourning dove was on the ground again looking for more twigs. Male and female look similar, but from our studies of their behavior we knew that the male gathers the nesting material. We watched as he selected another suitable twig, flew into the pine, and joined his mate, who was standing on the beginnings of a nest.

To our surprise the male hopped onto the female's back and reached over her shoulder to give her the twig. He then flew off for more nesting material while she lodged the twig into the existing structure. We saw this ritual repeated several times in the next ten minutes; then both birds flew toward the feeder.

This ritualized twig-passing, which is common among doves and pigeons, is unusual in North American birds. In most species only the female collects nest material and builds the nest. Why doves and pigeons have a more elaborate ritual is not known. Some suggest twig-passing behavior, now an aspect of nest building, was once a part of courtship, and that it might serve to increase the pair bond.

Because of our fascination with this nesting pair, we watched the mourning doves on our property more closely over the next few weeks. We saw several other common behaviors, one of the most spectacular being a flight display. In this display, an unmated male took off from a perch with deep, exaggerated flapping, clapping his wings together below his body. After rising 100 or more feet, the bird stiffly held his wings out to the side and descended in a long, circular glide. Scientists believe that this display, the flap-glide-flight, advertises the male's presence to unmated females.

When the male flaps and glides in this display, his flight pattern closely resembles that of a sharp-shinned or Cooper's hawk. These hawks feed on small birds and the prey have come to recognize the raptor flight pattern. The male dove's flight, having evolved to resemble that of these Accipiter hawks, may be more eye-catching to a female than normal flight.

After a male lands from one of these flights he often makes another display, the perch-coo, which further advertises his presence to unmated females. The bird sits upright, puffs out his neck feathers, bobs his tail several times, and gives his familiar call, a mournful *ooahoo oo oo oo.* We hear this call throughout spring and summer. When we lead bird walks, we find that many people do not realize that this sound is coming from the doves. In fact, on one bird walk, after hearing mourning doves calling all around, a participant declared, "Boy, there sure are a lot of owls around here."

Mating is another mourning dove behavior that we have observed from our windows. Several other displays precede mating, and it takes place on exposed perches, so it is fairly easy to spot.

Look for two doves perched side by side, preening themselves. If they then start to preen each other, the chances are good that they will mate. Following mutual preening, billing occurs. The female places her beak in the male's beak and the two bob their heads up and down. After this display, the male steps onto the female's back and they mate. After mating both usually preen a little more and then fly off.

If you locate a mourning dove nest, you can observe other breeding behaviors. For example, in many backyard birds, only the female incubates the eggs, and in species where both sexes incubate, male and female change places on the nest frequently throughout the day. In mourning doves, both members of the pair incubate, and the two change places only twice each day—between 8:30 and 10:30 in the morning and 4:30 and 5:30 in the afternoon. The female incubates the eggs all night, the male all day.

A few days before the eggs hatch, sections of the mourning dove's crop expand and the walls thicken. A white liquid is secreted from these thickened walls. Both parents feed this liquid—sometimes referred to as "pigeon milk"—to the young by regurgitation. The young put their bills into that of the parent and the parent pumps food into them.

When the nestlings are older the parents feed them regurgitated seeds and insects as well. Other backyard birds bring individual food items to their young, making many trips to the nest every hour. Because the mourning doves store seeds in the crop, the parents feed the young only a few times a day, but each feeding is large.

When they leave the nest, young mourning doves are almost the size of their parents; however, several features distinguish them. The tail is shorter than the adult's, the black spot behind the adult's eye is lacking, and the wing and body feathers are edged with a thin buffy line. The adult has no line. After leaving the nest the young mourning doves tend to join other juvenile doves and feed together in small flocks. In late summer and fall, adults and young mix in larger flocks, feeding together by day and roosting together at night.

Many people dismiss mourning doves as unintelligent, too common, or just a game bird, but we think they exhibit unusual behaviors that can be seen easily in your backyard. Their endless cooing on summer days can be a bit wearing, but we appreciate their presence and feel privileged that they chose our yard as a nest site. ☐

Donald and Lillian Stokes are the authors of Stokes Nature Guides and the *Bird Feeder Book.*

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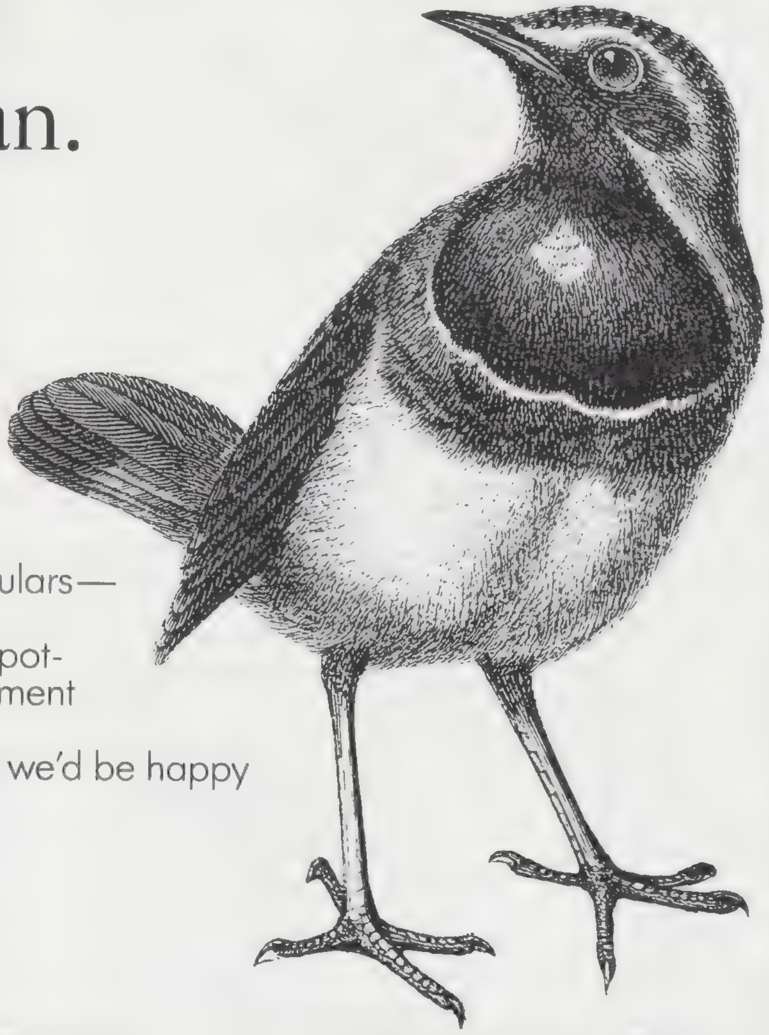

A LONG THIN LINE

Richard E. Bonney, Jr.

I spotted her right away. I'd never seen her before, but there, amid all the ties, sport coats, skirts, and stockings was a young woman in a South Texas Wildlife Corridor T-shirt. That had to be Cyndy Chapman, head of the Wildlife Corridor Task Force, winner of the 1987 Audubon-Bushnell Conservationist of the Year award. "Welcome!" she said. "Come in and look around. I can't really talk now, but why don't you stay at my house tonight? You can camp in the backyard."

The time was mid-March, the location, the lobby of the Palm Aire Motel in Weslaco, Texas. Weslaco is down in the Lower Rio Grande Valley, birders' mecca, where I had journeyed to get a jump on the spring season and to visit the South Texas Wildlife Corridor. I'd timed my trip to coincide with the annual dinner of the Frontera Audubon Society, the organization that spawned the Wildlife Corridor Task Force; now, refreshment in hand, I began wandering about a room full of exhibits, looking at photos, maps, and brochures describing the corridor, a unique effort to save what little remains of one of the most unusual ecosystems in the United States.

Not so long ago, I learned, the river known as Rio Grande ran wild and free. Fed by the mountain snows of Colorado and New Mexico, it watered a wide swath of land from the western deserts all the way to the Gulf of Mexico, creating a green ribbon of tree-filled bottomlands stretched across an otherwise dry landscape.

In southernmost Texas, as the river meandered its last 200 miles toward the sea, it created a subtropical forest. Uncommon trees such as the Texas ebony and brush holly flourished there, creating homes for wild cats and numerous species of birds at the very northern end of their ranges, including the green jay, ringed kingfisher, and Audubon's oriole. The land was remote, unspoiled.

By the turn of the century, however, thousands of farmers had moved into the lush valley. The nearly frost-free climate was ideal for year-round crops of citrus, cotton, grains, vegetables, sugarcane. The surrounding woodlands were cleared, the cleared areas cultivated, the Rio Grande's waters channeled and diverted to irrigate fields and reduce flooding. By 1904 the railroad had invaded the region, tying it to distant urban centers. Finally in 1921 came hard-surfaced highways, and the area was remote no more. Today the Rio Grande Valley is almost completely devoted to farming or vacation homes for "winter Texans," and the original subtropical forest is nearly gone.

But not completely. Little bits of native forest, about five percent of the original, still remain scattered here and there along the river. Together these forest fragments perpetuate 11 distinct habitats that are home to a staggering diversity of plants and animals. These include not only the fascinating birds that attract thousands of bird watchers to the valley every year, but four of the five wild cats still found in the United States, including the ocelot and jaguarundi.

And the corridor? That's an innovative approach to preserving and linking up these habitat fragments into one unbroken band of native habitat that will stretch all along the river's final 200 miles. The effort involves cooperation among the U.S. Fish and Wildlife Service (USFWS), Texas Parks and Wildlife, and several private organizations. Its completion is essential to ensure the long-term survival in this country of the ocelot, jaguarundi, and nearly 30 species of birds.

"The idea is to piece together at least 250,000 acres of protected land," Cyndy elaborated over a pancake breakfast. After a very enjoyable evening at the Frontera Audubon dinner I *had* spent the night in her backyard, where, while crawling out of my tent, I'd seen three valley specialties, a great kiskadee, a buff-bellied hummingbird, and a flock of chachalacas. "When completed, the corridor will stretch all the way from the river's mouth in the Gulf of Mexico to Falcon Dam, about 200 miles upstream.

"Lots of land along the proposed corridor is already protected as part of the Lower Rio Grande National Wildlife Refuge, which is the corridor's backbone. Then there's some state land—for example, Bentsen State Park—and some private land is protected, too. But we need to protect lots more. And, all these fragments need to be connected—that prevents the rare plants and animals that live here from becoming genetically isolated, which can lead to inbreeding. Even a small connecting strip between fragments is helpful—it may be too small for birds to nest on, but at least it gives them a chance to travel from place to place. Also, biologists think that the cats will use the corridor to traverse the valley."

How could such an ambitious effort be completed, I wondered? How could present landowners be persuaded to sell their holdings?

"Actually," Cyndy said, "that's not the problem. Right now it's a buyer's market. Because of the depressed economy here, many farmers have been put out of business, or want to get out of business, and they're happy to sell their land. In fact, land values have dropped 20 to 30 percent since the 1983 freeze ruined most of the citrus crop.

"No, the problem is getting the money. Each year Congress appropriates funds to enlarge the Lower Rio Grande Refuge, but it's never enough. Close to $1 billion is available to Congress for land acquisition each year, but only about one-quarter of the money ever gets spent. The corridor could be completed for about $150 or 200 million, so the money is there—we just need Congress to allocate it. And unfortu-

MARY CLAY

nately, if we don't act soon, it'll be too late—because developers will buy the land, and it'll be lost forever.

"That's why we started the task force. Completion of the refuge isn't going to happen if USFWS has to do it alone. The agency needs a solid showing of grassroots support. So the task force includes representatives of major environmental, sports, and tourism promotion groups, and these folks raise funds and provide support for the land acquisition program.

"Also, we work on filling in those parts of the corridor that aren't part of the proposed federal refuge. For example, Texas Parks and Wildlife has already acquired a lot of land for management of white-winged doves, which are hunted here; now we're calling on the department to spend their nongame funds on acquiring even more land. We've also helped to start a land trust, the Valley Land Fund, that can buy and hold land that's not slated for acquisition by either the federal or state governments."

Before long I was stuffed with pancakes and information. The conversation had drifted far afield, and it was time to go birding. So I set a time a few days hence for debriefing, packed my gear, and headed northwest for Falcon Dam. This monstrosity, built in 1953 to stop the Rio Grande from flooding the lower valley, is the farthest downstream of many obstructions to the once-mighty river. I camped that night at Falcon State Recreation Area and the next morning began my tour of the corridor with a hike along the river below the spillway.

Here the river looks pristine. It's bordered on both sides by lush vegetation and studded with small islands and wading birds. The habitat, known as Chihuahuan Thorn Forest, ranks fifth nationally as a unique and threatened ecosystem. I walked through a gate and down a dirt road. Almost immediately I spotted two more of the region's special birds, the tropical kingbird and Audubon's oriole. The morning was warm and clear, and I passed several other birders, who waved cheerful hellos. After walking a mile or so I sat by the river and watched it flow by, carrying wigeon, bufflehead, and cormorants along in its current. Sitting there, basking in the sun, it was easy to imagine that this thornland would always look the same, yet much of it is still privately held and threatened by quarrying, grazing, cultivation, and development.

Returning to my car I headed southeast along Highway 83, following the river. I quickly saw why the corridor is needed; in most places, farm fields stretch all the way to the river's edge. After just a few miles I came to the little town of Salineno and headed down a small side road. I'd heard about an out-of-the-way spot, the backyard of a bird-watching winter resident, where brown jays frequently visit an assemblage of feeders. The brown jay was one of the few valley rarities that I'd never seen before, and I was anxious to get a look at one. Shortly I found a driveway with a sign: "Birders, Sí. Cars, No!" No one was around, but the feeders were obvious.

After half an hour I'd had no sign of any brown jays, but the feeders' owner, Pat DeWynde, came driving in with a bag full of groceries. "No luck?" she asked. "Well, do you have a few minutes? I'll take you for a walk—I think we'll find some jays closer to the river."

Pat took me to the end of the road, unlocked a gate, and ushered me onto a path through an unspoiled stand of native shrubs and trees. "This is private land, but it's part of the wildlife corridor," she said with pride. "The owner, one of our neighbors, has entered into an agreement with USFWS not to develop it."

We soon spied an Altamira and a hooded oriole in the same tree, breathtaking splashes of orange on green, but still no sign of a brown jay, although I could hear one calling nearby. Finally, as we headed back along the trail, we did get a glimpse of two of the nondescript, crow-sized birds through a tangle of branches. Not a great look but better than nothing.

LARRY R. DITTO

SID RUCKER

The green jay, above, chachalaca, below, and ocelot are three species native to the Lower Rio Grande Valley. The future of their subtropical habitat depends on the completion of an innovative wildlife corridor.

Leaving Salineno I continued downriver, on toward Bentsen–Rio Grande Valley State Park. I was anxious to see this fabled birding hotspot, which is about halfway down the corridor and, at 585 acres, one of its bigger chunks. Approaching it I was disillusioned, for agricultural fields stretched on for miles, and the only birds visible were vultures. But the park itself was beautiful. The vegetation is dominated by scrubby brush—mesquite and prickly pear—along with stands of native woods including anacua, ebony, hackberry, Mexican ash, and tepeguaje. Many of the larger trees are festooned with Spanish moss. On a quick walk before dinner I visited a small lake where I spied a few least grebes swimming near shore and a ringed kingfisher perched on a limb over the water's edge. Then I headed over to the campground.

This campground has got to be the most amusing one I've ever seen. Nearly all the campers are birders, and first thing in the morning, long before light, dozens of them began wandering around, promenading the campground's loop road, peering into each other's sites with binoculars. Lots of unusual subtropical birds visit feeders here—in fact, feeder stands are provided as part of the standard campsite equipment—and from my tent I could hear voices shouting over the incessant din of great-tailed grackles: "Clay-colored robin at site 8! Crimson-collared grosbeak at site 29!"

I spent the morning at Bentsen, walking the nature trails, talking to other birders, and being escorted by some friendly folks to see a green kingfisher, a tiny jewel of a bird. Then I headed east again, bound for an appointment with Bob Schumacher, who was then manager of the Lower Rio Grande National Wildlife Refuge.

This refuge is perhaps the most unusual one in the entire national system. Most national wildlife refuges are situated within one boundary of blue and white signs, but Lower Rio Grande comprises 63 individual parcels strung out all along the corridor and headquartered at Santa Ana National Wildlife Refuge, just a bit southeast of McAllen. There, in Bob's bright office, filled with stacks of papers and map cases, the amiable biologist unrolled a map of the corridor and spread it on a conference table.

I'd seen the map before, but now, after traveling half its length and viewing its landscape in person, I appreciated it all the more. I was at once heartened to see how much land was already protected and dismayed to see how much still needed to be purchased.

"Right," Bob said, "we are interested in a continuous belt of land along the river. And we are further interested in lands of a significant, unique wildlife habitat value throughout the four counties along the river. We have to link existing remnants, what we call habitat islands, with reforested segments. We have to provide food, water, and cover between the sections of brush so animals like the ocelot don't have to confront dogs and highways as they move from place to place.

"Look here." He stabbed his finger at the map. "This is Bentsen State Park, this is our Abrams tract, these two pieces we just acquired." Taken together, the lands added up to a good-sized parcel. But there were still so many gaps, and I asked Bob my burning question. Did he really think completing the corridor was possible?

"Sure," Bob said. He explained that refuge biologists had identified the land they felt was most valuable for wildlife, and that the federal government was buying it up as fast as funds became available. The final goal for total acquisition is 107,500 acres; at the beginning of 1989, about one-quarter of that land had been protected, either by purchase or by conservation easements—deals in which landowners receive money for agreeing to restrict the ways they use their land.

Ten years ago the corridor was perceived as a pipe dream. Now there are lots more folks coming around asking if it can be done.

"But time is of the essence," Bob warned. "Modern farms are getting bigger and bigger, the old hedgerows are coming out, fields are getting larger, and there's less and less habitat every day. In some areas we have only a fringe of unspoiled habitat along the river. If we don't act soon, we'll soon begin to see whole populations, even species, fall off for good.

"Still, it's the old saying: the glass is half empty or half full. Ten years ago, the corridor was perceived as a pipe dream. Now, there are lots more folks like you coming around, asking if it can be done."

What had changed, I asked him?

"I think the change is probably people talking," he said. "Mutual support, a very clear need to do the project. Also, over time, a certain degree of accomplishment brings enthusiasm—more people now know this project can be done. There are fewer skeptics, more supporters. Also, looking at the big picture, this is not just a USFWS project of 107,500 acres. Just about every agency now has its finger in the pie, and the task force is tracking them all. Involvement is increasing, which is a very positive thing."

Looking at the map, I could see that in some places along the proposed corridor no native habitat remained. Does it do any good to acquire farmland, I wondered, when that's all that is left?

"Definitely," Bob said. "In most cases the land will grow back to brush; eventually it should revert to forest. It may not be exactly like the native forest, but it will be similar."

Leaving Bob to his work, I spent some time checking out the exhibits in the Santa Ana visitor center, then headed out onto the refuge trails. Santa Ana comprises less than 2,000 acres, yet is the largest chunk of protected land on the corridor and hosts more than 370 species of birds and 455 kinds of plants—one of the highest counts of any federal refuge. I added two more valley specialties to my list, bronzed cowbird and northern beardless-tyrannulet, then headed down past Brownsville to my final destination, the Sabal Palm Grove Audubon Sanctuary.

There I met Rose Farmer, sanctuary manager, who was waiting for me at the visitor center, watching an olive sparrow playing hide-and-seek in a bird feeder. Within minutes the tall, tanned, and knowledgeable woman had me touring this unique refuge, which includes 32 acres of *boscaje con las palmas* (little forest with palms). "The Texas sabal palm is the only palm tree native to Texas," Rose explained. "Once it grew up the river for miles and covered probably 40,000 acres. But now it's endangered; this sanctuary preserves the best remaining, least disturbed stand of climax Texas sabal palms in the country."

As we drove down a back road, Rose waxed eloquent on the subject of habitat restoration, picking up where Bob Schumacher had left off.

"Revegetation works!" she told me, gesturing out the window of her Audubon pickup. "Look over there. In 1980, that was a sugarcane field. In 1983 it was replanted with palms. And now, as you can see, some of them are already ten feet tall." Sure enough, they were. "Recreating the diversity of the original forest is pretty hard. In the past, flooding helped to maintain the native plant communities; now, the river is no longer allowed to flood. Still, we're hopeful that we can do a lot toward restoration, although we're not sure how long it will take."

On my final day in the valley I went back to Weslaco to talk again to Cyndy Chapman. I was now quite impressed by the amount of cooperation that had gone into creating the corridor—among federal, state, and local governments and local citizens. I was also impressed with the amount of pride and support that the local communities seemed to feel for this unique wildlife refuge. I realized that the task force, under Cyndy's leadership, had a lot to do with the success of the project. How did she get interested in the corridor, I wondered?

JUDY BURRILL

Lush growth at the Santa Ana National Wildlife Refuge, presently the largest protected parcel along the corridor.

"I've always had an interest in birds," Cyndy told me. "But I guess I really started thinking about habitat loss in the valley when I came out into my backyard one day and saw a tree full of broad-winged hawks. I realized that they were stuck in that tree because that was all the habitat left. I decided I wanted to do something to change the situation, so I went to the local Audubon group to see how I could help."

Quickly Cyndy found herself appointed chair of the group's conservation committee. Then, when that group's responsibilities got out of hand, the work was split and the Wildlife Corridor Task Force became a separate entity with Cyndy at the helm. Now she works on the task force nearly full time, completely unpaid, writing letters, organizing meetings, lobbying for increased government support, and answering questions and cooking pancakes for wandering journalists like me.

"So how did the future look?" I asked.

"Well, local support for the corridor has been gaining momentum," she said. "Business people realize that its completion will be good for the economy—that it will help stabilize land values, keep farmers from going under, and attract lots of tourist dollars. Even the Alamo 4-H club has gotten involved—it's trying to get every business in Alamo to contribute to the corridor.

"But time is getting away from us. The Lower Rio Grande National Wildlife Refuge was authorized ten years ago and is barely one-third complete. Congress needs to appropriate the rest of the needed money, fast. Less than $28 million has been allocated so far, and nearly 90,000 acres identified for acquisition are still unprotected. It's going to take another $150 million at least, and the longer we wait, the more expensive it's going to get."

On that sobering note I gathered up my papers and packed my gear for the long plane ride home. Cyndy walked me out to the car, past the bird feeders, the bird baths, and the squawking neighborhood chachalacas. When I rolled down the window to say good-bye she handed me a package. "To remember us by," she said.

Inside was a Wildlife Corridor T-shirt. □

For fiscal year 1990, the Lower Rio Grande National Wildlife Refuge received $8 million. Once again this was the largest appropriation for any national wildlife refuge. Still, the amount was $2 million less than the year before, and far from the minimum of $150 million needed to complete the corridor. Most of the 1990 funds have already been spent, and land continues to be lost to development. For more information: Wildlife Corridor Task Force, P.O. Box 8124, Weslaco, Texas 78596. (512) 968-3275.

THERE'S LIGHT AT THE END OF THE CENTURY

(BUT THE CANARY JUST DIED)

Pete Dunne

Well, they dropped the ball in old Times Square. The people sang, the universe shrugged, and the beginning of the end of the 20th century has begun.

Ten more years and we're out of this rotten century. This sad, miserable, myopic excuse of a century that ripped the entrails out of a living world then whimpered at the sight of its own blood. Ten more years and we get a fresh start. Nothing like a new century to set the world right. Right?

Let's leave behind our losses and drive straight to Paradise. You can't cross the threshold of a fresh, new century with a truck full of sin. That's what got us evicted from Paradise in the first place, remember?

Hold it! Don't remember! Forget. Don't look back. Just keep your eye on the great new world. *This* is the century where we're making all the mistakes. The next one, ah, the next century, that one will be a keeper.

We might as well forget about the passenger pigeon and the heath hen. Those were just glitches we inherited from the barbarians who ate up the 19th century. The ones who shot up all the bison and killed all the whales. Well, a lot of them anyway. More than enough to give the vestigial barbarians of this century a good head start on killing off the rest.

STEVE CARVER

Keeping backyards safe for barbecues

Too bad about the Carolina parakeet and the Bachman's warbler. (How were we supposed to know that the silly little warbler needed bamboo thickets?) And wasn't it criminal what happened to the ivory-billed woodpeckers in the Singer Tract? What do you suppose they did with all those trees? Made posters I guess. I mean, it wasn't like nobody knew that the critters were in there. But then came The War, a national emergency. Were we supposed to let a persnickety woodpecker sit in its royal thicket square in the way of our effort to make the world safe for democracy?

What war? The war after the war to end all wars.

And isn't it a crime what happened to the condor? I don't doubt that the birds have been on the way out since they ran out of mastodons to eat. The bird probably should have been put up on blocks long before this. (What are we going to do in the next century with an avian Edsel?) I'm just saying it's a shame that the bird couldn't keep up with the times, I guess. (If I were a Kirtland's warbler living in jack pine forests in Michigan, I'd be considering the nesting potential of junipers and ornamental holly.)

Oh fie on this century! Fie on it and forget it.

Forget those savages who stood on that Pennsylvania hillside and built a mountain of dead hawks beneath them.

Forget the slob hunters, the game bootleggers and market gunners. Waterfowl numbers are so low now that it doesn't make any difference anyway.

And DDT, can't forget DDT.

Forget DDT and the stupidity that makes people content to poison a planet just to keep backyards safe for barbecues. Why weren't they using safe options like BT, Sevin, Malathion, and other things I can't pronounce?

ARE YOU LISTENING TO ME? CAN YOU HEAR WHAT I'M SAYING?

Of course, there are a few problems we'll have to clear up before punching into the 21st century, into Paradise. There's that hole we blew in the ozone layer that will have to be patched, and a couple of oceans that should be passed through a kidney. We'll have to slow down the decline of long-distance migrants; figure out why sanderlings are down 80 percent; figure out where all the wood thrushes have gone.

We should convince the growing populations of the Third World to stop growing, ask the Japanese to leave some rainforest in Indochina, and discover a good, safe, cheap, benign alternative to fossil fuels (so that the oil companies won't be forced to rape the Arctic).

Nothing insurmountable. Just a little housekeeping. Just a little attitude adjustment. Just a new approach to an old world hell-bent for Paradise.

Why, with luck, we might even be able to take the condors off of blocks and stock them in the Grand Canyon—a living tribute to how much we've learned from our forgotten mistakes in a fresh, new century. □

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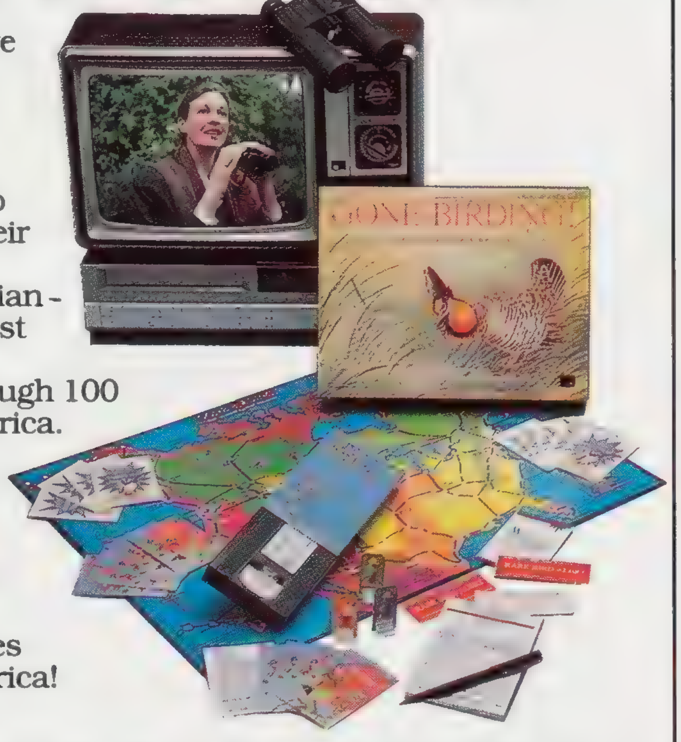

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Cornell Laboratory of Ornithology

THE LIVING BIRD

Quarterly

Summer 1990

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THE LIVING BIRD *Quarterly*

Cornell Laboratory of Ornithology Summer 1990/Vol. 9 No. 3

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Cover: Military macaws are among the largest of the parrots. The brightly colored feathers that most macaws exhibit make them particularly popular as cage birds. The custom of keeping parrots in captivity dates back to ancient Roman times; Emperor Octavian had a parrot trained to greet him, and other notables built vast aviaries for their pets. Photograph by John Cancalosi.
Back cover: Scarlet macaws and red-and-green macaws possess prototypical parrot plumage: blocks of vivid and contrasting colors. The gregarious birds supplement their vegetarian diet of nuts, fruits, and seeds with mineral clay exposed along riverbanks. Photograph by Bruce Lyon.
Right: That was a narrow escape. Piping plover contemplates dune buggy track at Jones Beach State Park, New York. Photograph by Robert Villani.

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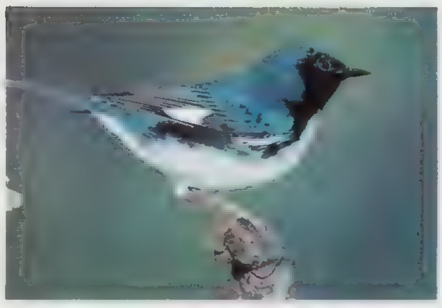
36 IN THE FIELD *by Jack Connor*
Why in the world has Jack traded his fast-accelerating 10x40s for his battered, old, thumb-focused 7xs?

38 THE CATBIRD SEAT *by Pete Dunne*
Get that magazine away from Pete before he sees the binocular ad with a moose, a curvaceous female, and an outfielder committing suicide against the backfield wall.

p. 16 Humans track, plovers tire

159 SAPSUCKER WOODS RD.


Michael Graybill and Jan Hodder

Black-throated blue warbler

The Winner Is . . .

Dear Suzanne Card:

Hey, you won the contest! Yes, the black-throated blue warbler is the correct answer.

I had to switch prizes. The last line of my column was accurate—I can't seem to locate the box of books holding *The Mind of a Mnemonist*. So, I'm sending you a copy of my book, *The Complete Birder*, and hoping you won't report me to the New Jersey Unfair Practices Commission.

Sincerely,
Jack Connor
Port Republic, New Jersey

Columnist Jack Connor challenged readers to guess which North American songbird "wears a vest pocket handkerchief in both adult plumages" ("Merlin Wore a Pointed Hat," Winter 1990). Seven people answered correctly; Ms. Card was the first.

Speak Up, Hawaii

Why is there such a lack of public support for endangered Hawaiian birds ("Silent Hawaii," Summer 1989)? One factor is hinted at in the sidebar. Not only do these birds live in remote forests on isolated islands, but their very names are meaningless to those who don't speak Hawaiian.

One name that was mentioned, "po'ouli," is not even a traditional Hawaiian name. When this bird was discovered in 1973 it was given a scientific name derived from ancient Greek roots, *Melamprosops phaesoma*, meaning "black forehead–brown body." No Hawaiian name was known for the bird so it was given the new name "po'ouli." Here we have a bird with a vernacular name that may be understood by fewer Americans than its scientific name!

David Wilcove has done a fine job of conveying the essence of the po'ouli and other Hawaiian birds to people who may never see these birds. Wouldn't his job have been easier, though, if all these birds had descriptive English names?

Peter Donaldson
Pearl City, Hawaii

Winter Feeding Benefits Bluebird Competitors

Margaret Brittingham's research ("Should We Feed Birds in Winter?" Winter 1990) has answered a number of interesting questions, but has not addressed another possible harm done by feeding birds.

My work on eastern bluebirds in Connecticut has forced me to look at the competitive side of the equation. Are bluebirds, which do not use feeders, disadvantaged by species that compete with them for nest sites and do visit feeders? I believe they are.

Ms. Brittingham's findings demonstrate that, at least in chickadees, individuals that use feeders have higher survival rates during cold winters. If this is true for other feeder species such as starlings and house sparrows (she suggests it is) we may conclude that more bluebird enemies will make it through the winter than will nutritionally unsubsidized bluebirds. In numbers alone, the competitors will have the advantage.

David O. Hill
Guilford, Connecticut

DEAR MEMBER:

Ornithology means the science or study of birds, all aspects of them—bone, blood, and sinew, their sometimes inexplicable behavior.

Ornithology means watching chickadees from the window or chasing lilac-breasted rollers in southern Africa. Ornithology means monitoring birds to detect changes in the size and distribution of their populations; it means learning to identify them merely by their calls and songs.

At the Laboratory, ornithology is our middle name—our last name, actually—and on the eighth anniversary of *The Living Bird Quarterly*, we continue to aspire to become one of the threads of ornithology's intricate cloth. In this issue, for instance, we have approached the discipline from several angles: bird conservation, biology, legend, humor, the active amateur, birding, and just plain appreciation.

The conservation aspect of ornithology is the meat and the message of two articles. One, the virulent conditions facing exotic birds bought and sold in the pet bird trade, was written by Dr. Frances James, professor at Florida State University; the other, the prolonged process of placing the piping plover on the endangered species list, is a first-hand account by John Sidle, a conservationist for the U.S. Fish and Wildlife Service.

Ornithology means biology, and the biology of reproduction is discussed in "When Monogamy Isn't." Bees do it, educated fleas do it, and birds do it, too, sometimes with more than one mate. Drs. David Westneat and Paul Sherman, both here at Cornell, explore the biological advantages of multiple copulation partners, and explode the myth that birds are strictly monogamous.

Cigars? Cigarettes? Eaglestones? Ornithology means legends, and one has reached us from the classic past through Roman naturalist and writer Pliny the Elder, 23–79 A.D. He was the first to record the existence of eaglestones, odd little objects supposedly dropped by birds into their nests and believed to have possessed powers of fertility. Eaglestones have departed into the realm of myth, but today's birds do build nests using some unexpected artifacts, including discarded stogies.

It bears repeating: ornithology means people, and one of its outstanding amateurs is Harold Mayfield. His work on the Kirtland's warbler, his finely calibrated mind, his passion for perfection, his resources and energies have perhaps saved a species from imminent extinction and have surely advanced the methods of the science.

And, we hope, ornithology means humor and appreciation. It's the hawk eyes of Pete Dunne seeing through birder-oriented ads, while Jack Connor has a field day with his new binoculars, and an awakened Jack Wennerstrom lies in bed wondering about a gout-destined owl whose taste runs to gyulai and krakowska.

Ornithology, the Lab, the *Quarterly*—sewn firmly but so tenuously to those flighty things—the birds. —The Editors

New Preserve in New Mexico

The Gray Ranch, 500 square miles of unspoiled New Mexico habitat, was purchased by The Nature Conservancy (TNC) in January 1990. Environmentalists applauded the acquisition of what has been called the most significant single block of southwestern habitat available in a lifetime.

The U.S. Fish and Wildlife Service had planned for many years to purchase Gray Ranch as a national wildlife refuge. In autumn 1989, however, Interior Secretary Manuel Lujan and New Mexico governor Garrey E. Carruthers blocked a move by Congress to appropriate the $1 million down payment. TNC stepped into the breach in what is believed to be the largest private land acquisition in United States history. The conservancy is looking for one or more management partners to share the responsibility for the property.

The expanse of grasslands, foothills, and mountains boasts much of the same birdlife found in southeastern Arizona, a popular birding hot spot. Gray Ranch is home to 43 percent of all bird species found in New Mexico, including the zone-tailed hawk, flammulated owl, and elegant trogon. TNC is working on a management plan that will allow controlled grazing and access for birders, hikers, and photographers.

New Sound from Newtonia

A rare species of flycatcher, the red-tailed newtonia, has been rediscovered by Lab Associate Thomas Schulenberg and ornithologist Steven Goodman. The two researchers, both based at the Field Museum in Chicago, were part of a Smithsonian Institution expedition to the African island nation of Madagascar in October 1989. The bird had been known to science from only a single specimen collected in 1931. The Fanovana Forest where it was collected has since been cleared, and the bird was believed to be extinct.

Schulenberg and Goodman were surveying the animal life of southeastern Madagascar when they heard an unfamiliar bird song in the Marosohy Forest. Schulenberg quickly switched on his tape recorder. Later, the bird was confirmed to be a red-tailed newtonia singing hundreds of miles from the spot where the original specimen had been collected. The first-ever recording of the bird will be archived in the Lab's Library of Natural Sounds.

News from a Neotropical Conference

The spring influx of migrants just ain't what it used to be—that's the overall impression of scientists and birders alike. But until recently, few researchers had conducted long-term, large-scale studies to verify that populations are actually declining.

Two recent events have dramatically increased our understanding of changes in the populations of neotropical migrants. These birds—vireos, thrushes, warblers, and other familiar songbirds—breed in North America and spend the winter in the West Indies, Central America, and South America.

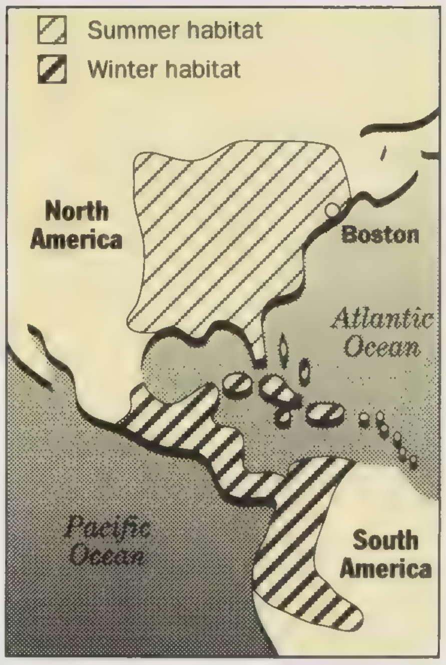
First, a widely acclaimed report has demonstrated that population declines are occurring throughout North America, not just in local areas. The study was published in October 1989 in the prestigious *Proceedings of the Academy of Natural Sciences* (PNAS). Then, last December, the Manomet Bird Observatory sponsored a symposium on neotropical migrants at which scientists presented abundant new information about the birds' ecology and behavior. Three hundred ornithologists from nine countries attended the event in Woods Hole, Massachusetts.

The PNAS report addressed the need to use a broad database to provide evidence of population declines. Authors Chandler Robbins, John Sauer, and Sam Droege of the U.S. Fish and Wildlife Service, and Russell Greenberg of the National Zoological Park extracted information from the North American Breeding Bird Survey. In this long-term survey, hundreds of volunteers census 2,000 areas annually in the United States and Canada.

The results were troubling. "Resident birds and temperate zone migrants are holding their own or even increasing," the authors wrote, but "20 species that migrate to the tropics showed significant declines, and only four showed significant increases." A supplementary study revealed that forest losses on the southern wintering grounds had more of an effect on migrants than did conditions on their northern breeding grounds.

At the Manomet conference, Sidney Gauthreaux took a different approach to the problems of estimating population trends on a large scale. Gauthreaux, an ornithologist at Clemson University in South Carolina, created a sensation with his interpretation of National Weather Service radar images.

Gauthreaux's comparison of images from the 1960s and 1980s suggests that the total number of migrants across the Gulf of Mexico has decreased by almost one-half in the intervening 20-year period. However, the radar analyses can't tell scientists which species are declining, or why.



Courtesy *The Boston Globe*

Breeding and wintering grounds for neotropical migrants.

This is a complicated question which some of the other symposium presentations only began to address. Researchers reported on a wealth of salient topics: documenting population trends in habitats from Maine to Puerto Rico; reporting on the winter habitat choices and social behavior of migratory birds; and measuring the availability of "stopover" habitat during migrations.

Reliable information on neotropical migrant populations must be amassed if governments are to legislate responsible conservation actions. In closing remarks at the symposium, Thomas Lovejoy of the Smithsonian Institution urged United States bird watchers to help Latin American countries study and protect their birds by donating money, sending equipment, or "adopting" foreign environmental groups. Latin American researchers at the conference added a request for help from their North American colleagues, not only by providing basic research tools like binoculars and bird-banding equipment, but by hiring local assistants for tropical projects—and learning Spanish, too.

FRANCIS LEPINE (VALAN PHOTOS)

WAKE-UP CALLS

Jack Wennerstrom

He was back again. My wife decided to wake me, for I was deep in sleep. "*Hoohoo-hoo-hoo-ah,*" he called rather softly from his favorite roost outside. He has been waking us for years, usually on midwinter nights. Sometimes he stays the day as well, but crows control the woods of late, making owl life miserable. I hadn't heard him in ages and was thinking he'd given up.

I wouldn't have blamed him. Crow harassment aside, it's a funky hangout for a barred owl. We are the only woodlot. Two acres of hardwood and pine, crowded by small yards and houses. The Pete Seeger Memorial Suburbs—plain dwellings, not exactly made of ticky-tacky, but they all look just the same. Their owners hire Chem-Lawn, shape yews around their porches, and trim their azaleas into squares and rectangles. There is the odd glass ball, pedestalled at mid-lawn, the lurking gnome, the lantern-fisted carriage boy—these days done in white-face—and, especially popular here in Baltimore, the pale cat bolted to the brickwork. The prevailing image of wildlife is a statuary deer made of plaster.

But I'm being unfair to the barred owl, and ourselves. He's a discriminating guest. Ours is an arboreal oasis, with 17 species of conifers, all of them mature, and nearly twice that number of hardwoods. We have hemlocks, larches, cedars, and cypress, and four kinds of spruce, even a longleaf pine that was abducted as a twig from Florida and now looms over the garage. Fellow critters are not of plaster. Woodchucks den by the shed, red foxes roam, there are monster American toads. Red-backed salamanders—when the rains arrive in spring—creep inverted down basement walls like shiny drippings of tar. Green-backed herons nested last year in a thin pine, though we are far from water.

There is also a patchwork of tangled fields that abut our land in back. They tempt deer to cross the highway when the rye is sweet in spring, and no doubt they tempt the barred owl. With voles in the fields and deer mice in the woods, he perhaps comes up from the river valley, if only for the night. He can also find Norway rats. These I believe he misses in the valley, in the big state park to our south. The thought first struck me that night.

I lay awake in bed, staring at a bar of moonlight on the floor and absorbing the owl's hollow sighs. I imagined him on his rounds. Some nights things are slow in the woods—perhaps the fox has been active, or the several neighborhood cats—so he does a little cruising to offset the competition. Behind the fields toward the highway is a line of big hemlocks, white pines, and Norway spruces—yard ornaments once, that have gotten out of hand. That's the opinion of our neighbors. I find them just right, and so, I believe, does the barred owl. They screen his approach to McDonald's just down the road. That's right, McDonald's, as in Styrofoam . . . er . . . hamburger. Most likely it attracts rats at night, to the trash bins in back. An old field stands adjacent; spruce walls the yards behind. Rats would come assorted: small to big, young to old, McJunior—if you will—to Big Mac. He could always grab a McJunior to go and park in one of the trees.

Far-fetched? A neighbor in that direction once told me about the owl. "It sits in our pine tree," she said, "the one that's gotten too big." "You mean that white spruce?" I asked. "Whatever. Dave sees it fly out sometimes, when he comes home late. But we're so close to the highway!" Now it all made sense. Just the right set-up if cruisin' for burger rats.

The owl had ceased calling, but the little bar of moonlight held my focus. Junk rats are one thing, I mused, as my wife turned back to sleep. We all get funny cravings. But most nights when the woods are slow and the weather witchy cold, when the odd vole won't suffice and junk rats just don't make it, I bet our discerning owl dines elsewhere. And I bet I know where. A place called The Old World Deli is down the road from McDonald's. Part of a field, a yard, and a big copse of maples lead to it on a slant from our woods. The garbage bins sit right in back, a few feet from the trees.

What a rat might taste like that has fed at The Old World Deli is anybody's guess. It would baffle Gordon Liddy. For here is garbage from a place renowned in the region. People come from out of town, from Annapolis and D.C., just to browse and buy in the store where this choice trash gets its start. My own wife—an excellent gourmet cook—spends considerable time and money there, peering in the big glass cases, poking through the stacks and shelves. There is paltuse and letnaya, jagswurst and nusschinken; raw sturgeon steaks and hot smoked sable, abborre and rollmops—a Continental cornucopia from the Baltic to the Adriatic.

The spoiled stuff gets dumped in back. I've seen the warp-lidded bins. No rat would find them a problem. Half-wrapped hunks of goose breast or kapchunka whitefish, smears of Swedish fontina or ricotta pecorina brenza, they are all there for the gnawing. Our owl need only hug his branch and pick out a gourmet quadruped. Perhaps a young Norway raised on Swedish, Danish, and Finnish scraps will end up as his dish, his "Scandia cuisine." Or a fat old lover of Eastern Europe—gouty with gyulai and krakowska—will drag his rat-tail too slowly and become a savory feast. Can our owl detect such richness? Folks talk of corn-fed beef and milk-fed veal. Of geese fattened on fruit. Is it tissue laced with veal pelmeni or double-smoked moskovskaya that draws our owl from the park? Food names ran through my fuzzy brain; I drifted back into dreams.

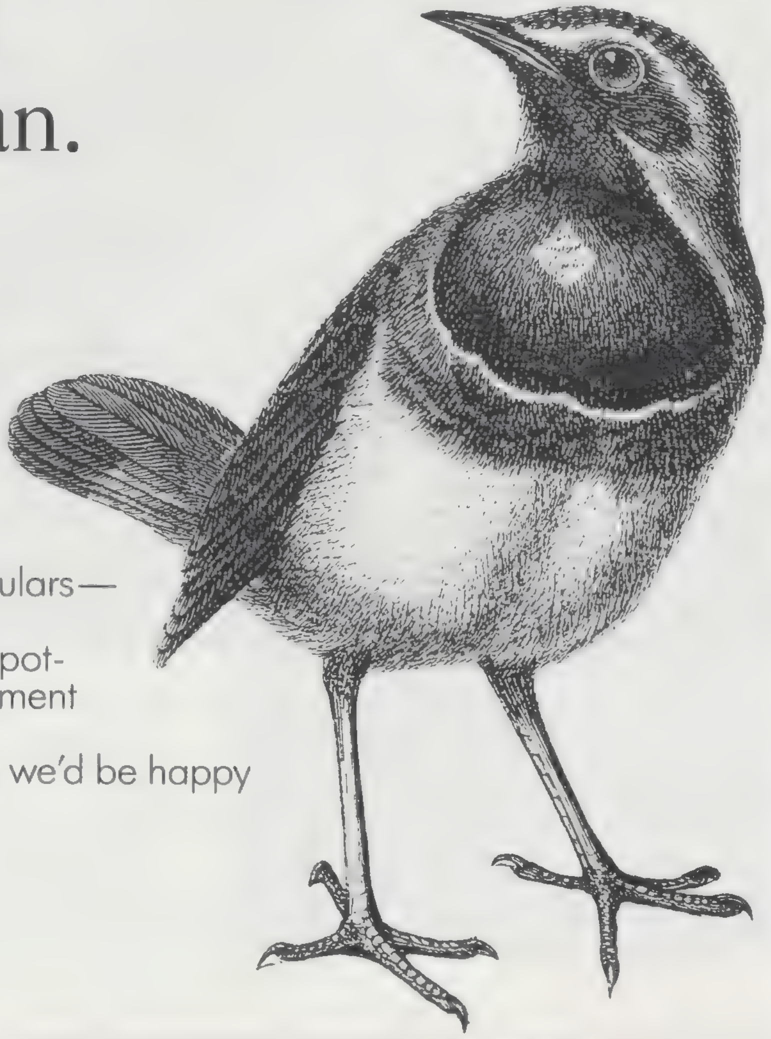
Come daylight I was my self again. Full of rational perspective. "How about our barred owl?" my wife said at breakfast. "It's really nice to hear him. I wonder what brings him back."

"Habitat overcrowding," I said matter-of-factly. "Down in the state park and elsewhere. Barred owl numbers are growing since the reversion of farmland to forest. There's a lot of displacement to urban edges, to woodland fragments and islands. Sort of like deer these days. They're expanding. So the dominant animals claim what's choice, while the weaklings, juveniles, and breeding losers—and there are too many of those—are dispersed. He's probably almost starved."

"Oh," she said flatly and passed me the Adriatic jam.

Early next morning we got another wake-up call. My bar of moonlight was there again, now touching the edge of the rug. Once more I imagined, and once more thought it true. Our barred owl was a connoisseur. He knew good trees when he saw them, and he knew good food as well. He wasn't just a displaced loser; he was clever, discerning—wise. Owls wise? Right, fella, my rational mind chimed in. And snakes and bats are evil. Giraffes are insincere. All right, laugh. Maybe it's the moonlight. Yes, that's it, I concluded. And also the owl. Owls, like moonlight, prick our souls. If not wise themselves, perhaps they are catalysts for wisdom. They cool us down with whimsy, smooth cerebral tatters, let deeper juices flow. Save the science for sunshine. This is darkness, luna-land, owl-time. Believe hard things in daylight, but softer ones at night. Some of them may be true.

The owl cooed deeply. I felt the little thrill that comes from having these birds near. *"Hoo-hoo-hoohoo-aahh,"* he repeated. The "aahh" had that ring of satisfaction. I focused on the moon-bar and wondered what it had been tonight: junk rats or gourmet quadrupeds? □



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White cockatoos crowd a bare cage. Right, the beautiful hyacinth macaw. An aviculturist called it "the dog of the parrot world," not for its appearance, but for its affectionate nature. 3,000 remain in the wild; one might sell for the price of a subcompact car.

THE SELLING OF WILD BIRDS: OUT OF CONTROL?

Frances James

The international marketing, both legal and illegal, of wild-caught birds has led to catastrophic decreases in some populations.

The hyacinth macaw, at a length of more than three feet, is the world's largest parrot. It is one of the most beautiful as well. Its feathers are dark cerulean, almost indigo, with lemon yellow rimming its eyes and lower mandible. The bird has an appropriately big voice — its screeches carry more than a mile. In Brazil, where it nests in holes in giant palm trees, it is surprisingly tolerant of humans. Researcher Charles Munn has said that hyacinth macaws "often forage on the ground in cattle corrals, sit on fences, drink out of cement water-troughs, nest in trees next to ranch houses, and seem totally at ease with an incredible amount of human and motor vehicle activity." Even so, the species is also highly endangered. Perhaps 3,000 remain in the wild.

In May 1989 the U.S. Fish and Wildlife Service (USFWS) announced that it had recovered 16 hyacinth macaws from smugglers trying to spirit them into the United States from Tijuana. Their tails had been cut off to make them easier to hide. They had been sedated, their wings, beaks, and feet had been taped, and they had been stuffed into plastic tubes. Ten of the birds were dead. This case was unusual in that the smugglers were arrested. Otherwise it was typical of the illegal trade in wild-caught birds.

The hyacinth macaw, like many other endangered species, suffers from destruction of its nest trees in its native habitat. Recent declines, however, are due largely to the birds' capture for sale as pets, both in their own countries and to overseas bird fanciers in rich nations such as the United States. By international treaty, endangered birds like the hyacinth cannot be imported for commercial purposes into the United States, but illegal trade in birds is common.

Most of the estimated 40 million caged birds in the United States are legitimate products of the aviculture industry or birds that have been legally imported. Eighty percent were bred in captivity for commercial sale, including parakeets, canaries, zebra finches, and cockatiels. The remaining 20 percent — eight million — were trapped as wild adults or taken as nestlings, primarily in tropical countries in Africa, Latin America, and Asia. Half a million birds are officially imported each year, according to the USFWS. Most of these birds were originally wild. The United States is the world's largest market for wild-caught birds.

In *International Wildlife Trade: Whose Business Is It?* author Sarah Fitzgerald estimates that at least 3.5 million birds enter the worldwide trade each year. Others put the figure higher. A British group, the Environmental Investigation Agency, quotes the national parks director of Senegal as stating that his country alone exported over nine million birds a year from the 1970s until the mid-1980s. The most frequently traded species are songbirds, such as finches, canaries,

(Continued on page 12)

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THE INSIDE STORY

When *The Living Bird Quarterly* asked Bob Prather for a picture of himself, he couldn't give us one. "Undercover work," he explained. "We don't like to have our pictures scattered around." Prather works for the U.S. Fish and Wildlife Service (USFWS), whose agents sometimes try to catch bird smugglers by posing as buyers, sellers, or importers of protected species. Since most of the group Prather supervises is based in Miami, we couldn't help thinking of "Miami Vice," and of Prather and colleagues as the Crockett and Tubbs of the animal import trade.

That image is not entirely inaccurate, but we soon learned that their work is more bureaucratic than glamorous: inspecting live animals and animal products, examining documents, filling out countless forms, entering data into computers, following cases through the courts. As senior resident agent of the USFWS Division of Law Enforcement, Prather oversees all the special agents, investigators, and wildlife inspectors in Florida, Puerto Rico, and the Virgin Islands. The group's job is to try to control the crucial juncture where birds enter the United States. To learn about their work, we recently spoke to Prather by phone at his office in Tallahassee.

TLBQ: One of your main responsibilities is to monitor imports that arrive by air at Miami. Do you get a large number of birds?

BP: Right now, we clear 300 to 350 shipments of animals and animal products a month. Maybe five to ten are commercial bird shipments. Each includes from a few hundred to a few thousand birds.

TLBQ: Do you try to inspect every shipment?

BP: No, we don't have the staff. We have seven inspectors, who also man the entry station 24 hours a day and do mountains of paperwork. We physically inspect 5 to 10 percent of all shipments.

TLBQ: Since you can't check them all, how do you decide which ones need closer scrutiny?

BP: The importers, of course, must declare what they're bringing in and have the right permits, so first we review the documentation. We might decide to inspect because the declaration lists protected species. Or because the birds come from a nation that exports lots of birds captured in other countries in violation of the CITES treaty, which prohibits trade in some species and restricts trade in others. We're more likely to look at shipments to importers with a history of prior offenses. Sometimes we get a tip that someone's bringing in prohibited birds.

TLBQ: From whom?

BP: Foreign governments. Aviculturists. Our agents. The importer's competitors. We try to develop systems of informants.

TLBQ: What does the actual inspection entail?

BP: We identify species and count the birds. We might inspect on the plane, at the airport, or in the quarantine station.

TLBQ: We understand that all bird imports must undergo a 30-day quarantine period. Who runs the quarantine stations?

BP: Most are privately owned, frequently by animal importers themselves. They're licensed and monitored by the U.S. Department of Agriculture. Although the cages are fairly large, the birds are usually pretty crowded. There can be sanitation problems. The USDA doesn't allow waste to be brought out until the birds clear quarantine because of potential disease problems.

TLBQ: What about bird mortality during shipping and quarantine?

BP: I've been doing this for twenty years, and shipping conditions are much better today. Years ago we used to see box after box of dead birds arrive, usually after long flights from Southeast Asia and Africa. Most birds we get in Miami are from Latin America, so they're only in transit a few hours. We don't see a lot of shipping deaths. Die-off generally results from diseases that aren't manifested until the birds face the stress of quarantine.

TLBQ: What problems turn up often during inspections?

BP: The most common is overages: stating in the declaration that there is a certain number of birds and including 10 or 20 percent more. We also see some stolen, forged, and altered documents. A CITES permit is issued for a hundred birds, say, and someone adds a zero to change the number and tries to import a thousand birds. Overall, though, relatively few shipments are verified as illegal.

TLBQ: What's the biggest problem your inspectors face in enforcing import laws?

BP: Dealing with laundering — verifying that birds originate in the country they're declared to have come from. Under CITES, responsibility for enforcement operates on a country-by-country basis, and traffickers often smuggle birds from countries that prohibit trade to countries that permit it. To do their jobs well, our inspectors should be able to identify all the wildlife of the world, including animal parts and products. We need information on basic taxonomy and geographical differences among various subspecies, even different races. We need experts who can tell us, say, that blue-fronted amazons declared to be from Argentina are actually found only in Brazil. Support from the scientific community is important to help us prove probable cause for taking enforcement action and to provide expert testimony in court.

Paperwork is also a problem. The simplest confiscation of excess birds generates a stack of paper literally three-quarters of an inch deep.

TLBQ: What types of penalties do traffickers receive if they're convicted?

BP: It depends on the crime, of course. For overages, we give the importer the opportunity to forfeit the excess birds, or we take legal forfeiture action. Our solicitor's office handles the final penalty assessment process. There can be big fines and prison terms if we get a criminal conviction.

TLBQ: What happens to birds you seize?

BP: First, we offer them to the American Association of Zoological Parks and Aquariums. They accept most of the endangered species, the CITES Appendix species, and the rare and valuable birds that need special care or placement. Others are auctioned off. Unfortunately, we can't legally prevent anyone from attending an auction, so the dealer the birds were confiscated from can end up rebuying the very birds we took.

TLBQ: Are the penalties violators receive severe enough to deter them?

BP: Well, we slow them up a bit, force them to change how they do business. As long as there's money in it, though, people will find a way to get their birds into this country. Closing the legal trade increases smuggling.

We'd like to have the authority to revoke licenses and permits and shut businesses down that repeatedly break the law. The courts have the authority to do this now, but they rarely use it. They don't like to deprive people of their sole means of livelihood. The USFWS has considered regulations mandating that licenses be revoked if a dealer is convicted.

TLBQ: In general, has compliance with CITES regulations been good?

BP: There's been an attempt. We see lots of suspected laundering through the countries that still permit exports. Even with species supposedly protected by trade restrictions in accordance with Appendix II of CITES, all that's needed to export birds is a CITES permit stating that trade in the species is properly controlled. Countries vary tremendously in how seriously they take their CITES obligations.

TLBQ: Some who have studied the international bird trade think that it will be impossible to control. They favor a total ban on importation of birds caught in the wild. A good idea?

BP: I know that a lot of bird people, breeders, would love to see imports closed down because it would enhance the value of the birds they raise and protect the wild species.

I think the Fish and Wildlife Service generally thinks of wildlife as a renewable resource, and that some species, properly managed and monitored, can sustain a harvest. We're dealing here with Third World nations that consider wildlife a source of income. It's been shown in the case of the leopard in Africa that if landowners can make money from export via trophy hunters, they have an incentive to manage leopards rather than eradicate them to protect their cattle. Whether this approach can be applied to other species remains to be seen. People today are trying to save the rainforest by demonstrating the economic value of taking a harvest from it rather than burning it down and planting crops for two or three years. Maybe harvesting wildlife is a way to make money without endangering species.

TLBQ: Would it be fair to say that much of the trade in endangered and smuggled birds is caused by certain importers and pet store owners who care about their own profits and not about what happens to the species in the wild?

BP: That's certainly part of the problem. Some importers are prosecuted over and over. And some retail pet stores buy birds out of a van without caring who the sellers are or where the birds come from.

Courtesy U.S. Fish and Wildlife Service

U.S. Fish and Wildlife agent inspects a shipment of birds in an aircraft cargo hold at Miami. Inspectors, who must be expert taxonomists, face mountains of paperwork for a simple confiscation of illegal birds. Because of chronic staff shortages, only 5 to 10 percent of all animal shipments are inspected.

TLBQ: What's the role of the consumer, the person who ultimately buys the bird?

BP: Probably the biggest difficulty I see with the whole bird trade is that retail buyers don't realize their impact, what the trade involves, where these birds come from. Lately, people who wouldn't dream of buying a wild-caught bird have been taken in by a misleading scheme. Birds are advertised as captive-reared, and buyers think that means they were hatched from captive parents. Some were. But most were taken out of the nest in the wild and then reared in captivity.

TLBQ: Any suggestions for the concerned bird-buyer?

BP: Until recently, one factor to look at was price. Wild-caught birds are usually cheaper than captive-bred. But smugglers are catching on now that they can charge just as much for illegal as legal birds. Other than that, just know your supplier. Know who you're buying from and ask for documentation of the bird's origins. If we remove the retail market for illegal birds, if people insist on buying legal birds only, we'll take a big step toward eliminating the problem we face at the border.

—D. R. Otis

larks, weavers, and thrushes. Few of these birds are considered threatened, but little research has been conducted to determine whether native populations can sustain such massive harvests.

Of particular concern are the psittacines, the parrots and their relatives. This group has more than 330 species, including lovebirds, lorikeets, rosellas, cockatoos, and macaws. About half a million psittacines are sold on the international bird market each year; of these, 250,000 come to the United States. Probably more than 95 percent are wild-caught.

The sale of exotic birds brings big bucks to the middlemen, but the Guatemalan at right who has taken some birds from their forest habitat will receive a meager sum. Above, in Bangkok the busy bird trade supports a crate manufacturing industry. Far right, this king parrot in Singapore faces a bleak present and an uncertain future.

Whether birds are imported legally or illegally, their sale is big business. Retail parrot sales are over $300 million a year in the United States. Those who purchase birds create the demand, and in the case of wild-caught birds, a series of middlemen get rich meeting it. The people who catch the birds, often farmers who have few other sources of income, usually receive a meager sum. The price of a wild-caught hyacinth macaw in Brazil ranges from $7 to $60, but here in the United States it can be sold illegally for $10,000. The price of a captive-bred hyacinth macaw would be even higher. Captive-bred birds are usually more expensive than illegally caught wild birds. However, because they are raised by hand, they are more accustomed to humans and make better pets. The smugglers mentioned earlier, had their birds lived and had they not been arrested, might have cleared over $100,000. The declines in many species of parrots are caused in part by conditions in the birds' own countries. Parrots are popular pets in their native countries, and in many rural cultures they are eaten and their feathers are used in ornaments. The international pet trade adds more pressure.

For many species no one knows how many remain in the wild or to precisely what extent they are influenced by the pet trade. Clearly, though, the international marketing of macaws in Latin America has contributed to catastrophic decreases in their populations. The Spix's macaw is now probably extinct in the wild; the Buffon's, military, and hyacinth macaws are very rare. Macaws have low rates of reproduction. According to Munn, 100 pairs may fledge only 15 to 25 young a year, so they cannot quickly compensate for population losses. With the supply of macaws diminished, bird catchers have shifted their attention to medium-sized parrots such as the amazons.

Species of birds in other groups also have been decimated by international trade. Peregrine falcons are now rare in Europe, largely because they have been captured for falconers and zoos. According to Greta Nilsson, author of *The Bird Business*, the chicks of helmeted hornbills in Southeast Asia are taken so often that permanent ladders are erected at nest holes. The long-wattled umbrellabird of the western Andes has disappeared near human habitation. The Asian hill mynah, once common in many parts of its range, is now found only in national parks.

The USFWS is responsible for enforcing our wildlife laws, for issuing permits, and along with the Customs Service and the U.S. Department of Agriculture (USDA), for inspecting shipments of imported animals at ports of entry. This system is the result of a United Nations treaty, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As of March 1990, 106 nations had ratified the treaty, including all the mainland countries of the Western Hemisphere except Mexico. The objective of CITES is to exclude endangered species from international trade and to promote the wise regulation of trade in species that are not endangered. Species listed in Appendix I of CITES are endangered and prohibited from commercial trade. Those in Appendix II may be traded under certain conditions. All of the parrots and their relatives are on one of these two lists.

The Animal Welfare Act requires that birds shipped here from overseas undergo a 30-day quarantine for detection of such diseases as exotic Newcastle disease, which can be communicated to poultry. In many locations adequate facilities for the care of birds during quarantine are not available. About 15 percent of the birds imported into the United States in 1988 died either in transport or in quarantine, according to the USDA. Although the average mortality rate at these stages has been declining, it remains unacceptably high for some species.

For the bird business to operate without hurting wild populations, three issues would have to be resolved. First, ideally, the birds' native countries in Asia, Africa, and Latin America would have to develop regulatory systems so that authorities could judge the effects of trade on each species. They would have to monitor populations, set quotas, and provide and enforce rules for methods of capture. At present, none of the source countries adequately monitors and regulates the export of their live birds. Many of these countries have severe economic and ecological problems and they have few trained biologists. They do not have the resources to enforce stringent systems of regulation of the export of their birds.

Poor enforcement of our import laws and regulations is the second problem. The United States has strict laws governing wildlife importation. The most important is the Endangered Species Act. It implements CITES and contains additional restrictions. Another piece of legislation, the Lacey Act, prohibits importing wild animals taken or traded in violation of the laws of the country of origin.

More than 90,000 shipments of animals and their products officially enter and leave the States each year and the USFWS has only 65 import inspectors for the entire country. Many of the inspectors are inadequately trained to identify animals and all are overburdened with paperwork. An unscrupulous exporter who includes in a large shipment of legal birds a few individuals of an endangered species has a good chance of getting away with it.

A related concern involves falsified documents. As more and more countries have prohibited the export of their wild animals, birds from these countries have routinely entered the United States through "laundering"—they are moved into countries that do allow export, such as Mexico, Argentina, Guyana, Senegal, Tanzania, and the Philippines, then reexported. "Country of origin" on the import forms is simply changed.

The third major problem is direct smuggling across international borders. At least 100,000 parrots a year are smuggled into the United States. The USFWS estimated that 26,000 parrots were smuggled in 1988 into the Brownsville, Texas, region alone. Thousands more are smuggled from Australia to Singapore, from Bolivia to Europe and Asia, and from Guatemala and Nicaragua to Honduras and Mexico. Recently, the smuggling of eggs has increased as well.

DAVID HISER (PHOTOGRAPHERS/ASPEN)

AL LARSON (2)

In a typical example, a parrot captured by a farmer in Guatemala is smuggled to Mexico, carried across the Rio Grande or brought into Brownsville in the door panel of a truck, and delivered to a motel. There a buyer, who had made previous arrangements, picks up the bird with the rest of a shipment, drives it to Chicago by truck, and sells it to a pet shop owner or through an ad in a newspaper. No records are kept. Many bird fanciers and shop owners will buy smuggled birds. They often cost less than legally imported ones.

Law officers sometimes succeed in catching smugglers. In October 1988 the USFWS announced that 36 people were under investigation in six states in connection with an organized ring for smuggling and distributing birds. One Michigan bird wholesaler admitted that she had distributed over $100,000 worth of smuggled parrots in the last year. Birds with a retail value of nearly $500,000 were seized. As of April 1990, 21 persons had been prosecuted and 11 sentenced. They were given total prison sentences of 5.4 years, and two smugglers were ordered out of the bird business for three years. In this case to date the criminal and civil fines have been $61,000.

In the hyacinth macaw investigation mentioned earlier, 12 people were charged with smuggling half a million dollars' worth of rare parrots and other birds. According to the indictment, southern California bird dealers had ordered protected birds from dealers in Argentina and Indonesia. The foreign dealers had smuggled the birds into their own countries from countries prohibiting export, provided false docu-

ments, and shipped the birds to Mexico. The birds were then smuggled into the United States via Tijuana. In addition to hyacinth macaws, other species listed in CITES Appendix I, such as palm cockatoos and military macaws, were in the shipments.

Steps are also being taken to curb the legal trade, to improve the conditions under which birds are transported, and to study the effects of the trade on wild populations. Animal-welfare groups have advocated regulations to limit the size of shipments to prevent the overcrowding of birds in shipping cages. PIJAC, the Pet Industry Joint Advisory Council, a lobbying organization for the pet and aviculture business, delayed carrying out the transport regulations for years after they were enacted under the 1981 Lacey Act. In May 1988 they finally became effective and now the sizes of shipping crates and water and feeding requirements are officially set.

In several states legislation has been introduced that would ban the sale of wild-caught birds. New York passed such a ruling in 1984, despite opposition from the pet industry.

International conservation groups are also working to regulate trade. The Parrot Specialist Group of the International Council for Bird Preservation is constructing an "Action Plan for Worldwide Parrot Conservation." The group will act as a parrot information clearinghouse and an advisor on policies concerning parrots. In 1987 TRAFFIC (USA), in collaboration with Wildlife Conservation International, supported a survey of the hyacinth macaw in Brazil, Bolivia, and Paraguay. A survey on blue-fronted amazon parrots in Argentina is in progress.

The World Wildlife Fund and TRAFFIC(USA) in 1988 convened the Cooperative Working Group on Bird Trade to conduct a comprehensive analysis of live imports of exotic avian species into the United States. The group included members from conservation and animal-welfare groups and the pet and aviculture businesses. Although their objectives differed, members found substantial common ground. In March 1990 they agreed on several recommendations to reduce mortality and control and curtail the wild-caught bird trade. They agreed that current enforcement of federal regulations and procedures are not meeting the intent of the Endangered Species Act, CITES, the Lacey Act, and the Animal Welfare Act.

The Working Group recommended that "the United States, as one of the principal consumers of wild-caught birds for the pet trade, reduce its reliance on wild avian populations and, within an agreed time frame, replace wild-caught with captive-bred birds for the purposes of the pet trade." The development of large captive-rearing programs, both here and abroad, was deemed the critical alternative to the sale of wild-caught birds. These recommendations have been submitted to the federal government and will be translated into draft legislation that will be submitted to Congress.

MARY ANN WOOD AND JOE McDONALD

Many who have studied the issue of the importation of wild birds favor its restriction to birds needed for research, education, and captive breeding. Such a policy would limit commercial sales to birds bred in captivity as was recommended by the Working Group. Large captive-breeding programs are already under way in the United States, Belgium, and the Netherlands. In Venezuela there is a pilot program in which wild parrots are encouraged to nest in boxes and the young are taken for trade. A ban on the commercial sale of wild-caught birds would undoubtedly boost captive breeding efforts.

BRUCE LYON

Although parrots may spring to mind at the phrase "pet bird," the most frequently traded species are songbirds including finches, canaries, larks, thrushes, and weavers. The golden weaver of East Africa, left, is sometimes taken by traders; scarlet macaw, above, is protected under CITES, as are all of the parrots and their relatives. Still, most parrots and macaws imported to the United States are wild-caught.

The United States prohibits the export of its native birds for sale, as do more than one hundred other countries; however, we are providing a lucrative market for birds from the few countries that still export their birds. Despite the best efforts of our understaffed regulatory agencies, the international bird business is barely under control. The popularity of wild birds as pets without effective regulation of the trade is causing the exploitation of tropical species.

As ornithologists and bird watchers interested in the welfare of birds, we should support legislation to remedy this situation. For the latest information on international trade in wildlife subscribe to the TRAFFIC(USA) Newsletter, World Wildlife Fund, 1250 24th Street, NW, Washington, D.C. 20037 □

Frances James is a professor of biology at Florida State University, Tallahassee. She was president of the American Ornithologists' Union from 1984 to 1986 and is currently a member of the administrative board of the Cornell Laboratory of Ornithology.

Further Reading

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TO LIST OR NOT TO LIST

John G. Sidle

The moment was almost sacred. It came late in 1985 when the assistant secretary of the Interior for Fish, Wildlife, and Parks at last signed the final rule that placed the piping plover on the endangered species list. The official document appeared on my desk the next day; within a week it would be published in the *Federal Register*, the government's daily journal of proposed and new rules and regulations. I felt relief and satisfaction knowing that government-sanctioned protection had arrived for the little shorebird. The cumbersome bureaucratic process had taken over two years.

I was in charge of the listing procedure for the piping plover. At first the process sounded simple and straightforward. Little did I know then that by design, it isn't. Under federal laws such as the Endangered Species Act, the government can create new rules and regulations. For a species to be added to the endangered species list the act requires a formal rule-making procedure; the government publishes a proposed rule in the *Federal Register*, notifies the public of it through the newspapers, and holds public hearings to air both favorable and dissenting views. Then, if a final rule is approved, it is published in the *Register* and codified into law. The long and labyrinthine process ensures that only truly endangered or threatened species are listed. Not every candidate species meets the endangered or threatened criteria, and surely protecting one not in need would be wasteful.

Because this was the first time I was in charge of listing a species, I decided to bone up on pertinent definitions and background. According to the act, endangered means "any species which is in danger of extinction throughout all or a significant portion of its range." Threatened denotes "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

The U.S. Fish and Wildlife Service (USFWS) is responsible for listing species. The criteria are present or threatened destruction or modification of habitat or range; overuse for commercial, sporting, recreational, scientific, or educational purposes; disease or predation; inadequate existing regulations; or other natural or human factors affecting a species' existence.

One factor, overuse for commercial purposes, has a precedent in the Migratory Bird Treaty Act of 1918 which established federal responsibility for protecting migratory birds. This treaty was written after alarmed bird watchers discovered that a staggering number of migratory birds were hunted and sold for their meat and feathers. The piping plover was one of these birds. The treaty controlled taking, selling, transporting, and importing migratory birds, their nests, eggs, parts, or products. At first I was surprised when habitat protection was not mentioned, but of course in 1918 it was not an issue.

With hunting banned the piping plover population improved, but not for long. In the mid-1940s came another downward spiral, this time because of the natural habitat destruction and residential and industrial development brought about by the postwar baby boom. The time for protecting the environment had arrived. Unlike the Migratory Bird Treaty Act of 1918, the 1973 Endangered Species Act listed birds and other vertebrates, invertebrates, and plants, and emphasized the protection of their habitat.

For example, a proposed project on the beach of a nesting piping plover has to ensure that habitat changes do not affect the bird. The USFWS issues biological opinions stating whether or not the construction will jeopardize the plover's continued existence. If a project is deemed harmful, it could be altered or scrubbed.

For me the piping plover listing process began in 1983 just after I arrived at the federal office building near the Minneapolis–St. Paul airport, having transferred from Arrowwood National Wildlife Refuge in the prairie pothole region of North Dakota. Now I was a "listing" biologist: I developed proposed species listings for publication in the *Federal Register* from a pool of candidates that the USFWS had determined might warrant endangered or threatened status. My supervisor urged me to take a hard look at the piping plover.

ROBERT VILLANI

Does the piping plover belong on the endangered species list? An unflagging USFWS biologist plows through piles of rules and procedures. He knows that water departments will dam, that land developers will argue. Public hearings will heat up, and plover numbers will continue to drop. Can federal protection come in time to save the small shorebird?

MICHAEL BAYTOFF

ROBERT VILLANI

Left, the plover's simulation of injury is meant to draw an intruder's attention away from its nest, but a two-ounce bird is hardly a match for beachgoers, vehicles, buildings, a whole rash of human development. Right, tracks testify to the passing of a recreational vehicle that brushed by a piping plover nest.

Despite 300 pages of guidelines and procedures he assured me that listing the piping plover was possible.

Still optimistic, I figured that listing the relatively little-known bird would be fairly routine. Then I remembered the snail darter, the tiny endangered fish that nearly stopped the building of multi-hundred million-dollar Tellico Dam in Tennessee in 1978. That same year the endangered whooping crane blocked construction of a dam that might have adversely affected the bird's roosting habitat on the Platte River in Nebraska. In fact, any construction project can be blocked by the powerful laws protecting endangered wildlife, and I suddenly wondered if someone's expensive scheme would be stopped by the piping plover.

The more I thought about it, the more convinced I became that I should be an expert not only on laws and procedures, but on the plover's natural history. Who knew when one of my answers might sway an opinion, perhaps the outcome?

I had already met the piping plover during studies of shorebirds at Chase Lake National Wildlife Refuge in North Dakota and knew a bit about it. The bird nests in open, sparsely vegetated habitats along rivers and ponds in the northern Great Plains from Manitoba to Nebraska, on Atlantic coast beaches from Newfoundland to North Carolina, and on the shores of the Great Lakes. It spends the winter along the Gulf coast, the Atlantic coast from South Carolina to Florida, and in the West Indies.

The nests are slight hollows in sand or gravel, often surrounded by pebbles, shells, or other beach debris. Piping plovers may look like all the other shorebirds pecking the sand for invertebrates, but unlike their relatives that nest in the thinly populated regions of the northernmost latitudes of Canada and Alaska, they lay their eggs and raise young on more southerly beaches dense with people, beach balls, and dune buggies. Along the Atlantic coast, for example, the piping plover was disappearing.

All the reading I had been doing had made me curious to see the problems for myself, so I traveled to Rhode Island to visit my parents and for a good view of plovers on the peopled beaches. Venturing down near the shoreline I noticed a number of danger signs. Bathers and their pets were unwittingly stressing the nesting plovers that were trying to feed. The chicks were especially upset. Houses near shore were built on stabilized and fortified dunes and beaches which prevent storms and waves from periodically sweeping away vegetation and opening up habitat for piping plovers. No wonder only about 10 breeding pairs were left in Rhode Island, compared to about 40 in their heyday.

Halfway across the country, in North Dakota, the human population is less than Rhode Island's, and one or two counties have more breeding piping plovers than all of Rhode Island or, for that matter, any other state. Six hundred pairs breed on the shores of prairie ponds and the sandbars in the Missouri River. Even here, since the 1930s, most of the river has become a reservoir or navigation channel, a deep lake along the upper portions and a dredged barge canal along the lower. Many sandbars now lie beneath huge reservoirs, never to break the surface again.

JACK SWENSON

Before it was dammed and dredged, the river was dynamic: sandbars, backwaters, currents, and pools provided ideal habitat for migratory birds. Lewis and Clark wrote in their journals of navigating among the many sandbars during their journey up the river. Other accounts have told of great floods rushing down from the Rocky Mountains, scouring vegetation and leaving a river channel filled with sandbars. The high flows were like hurricanes.

A few sandbars still float in patches on the Missouri. Several colleagues and I boated down the river from Bismarck, North Dakota, to Lake Oahe, created in 1958 by a dam near Pierre, South Dakota. We passed a sandbar where a piping plover fed. The sand was dry and white, evidence that the bar had been above water for some time. Ironically, although the bar was too dry, discharges from dams along the river often inundate nests and drown chicks. The U.S. Army Corps of Engineers manages these waters. How was the Corps going to react to a proposed listing of the piping plover? I imagined the blaring headlines: PIPING PLOVER STOPS NAVIGATION AND ELECTRIC POWER.

For a closer look at piping plovers I journeyed to Duluth Harbor on Lake Superior in northern Minnesota. I was greeted by ship traffic, car noise and fumes, ve-

(Continued on page 22)

PLOVERS OF ÎLES DE LA MADELEINE

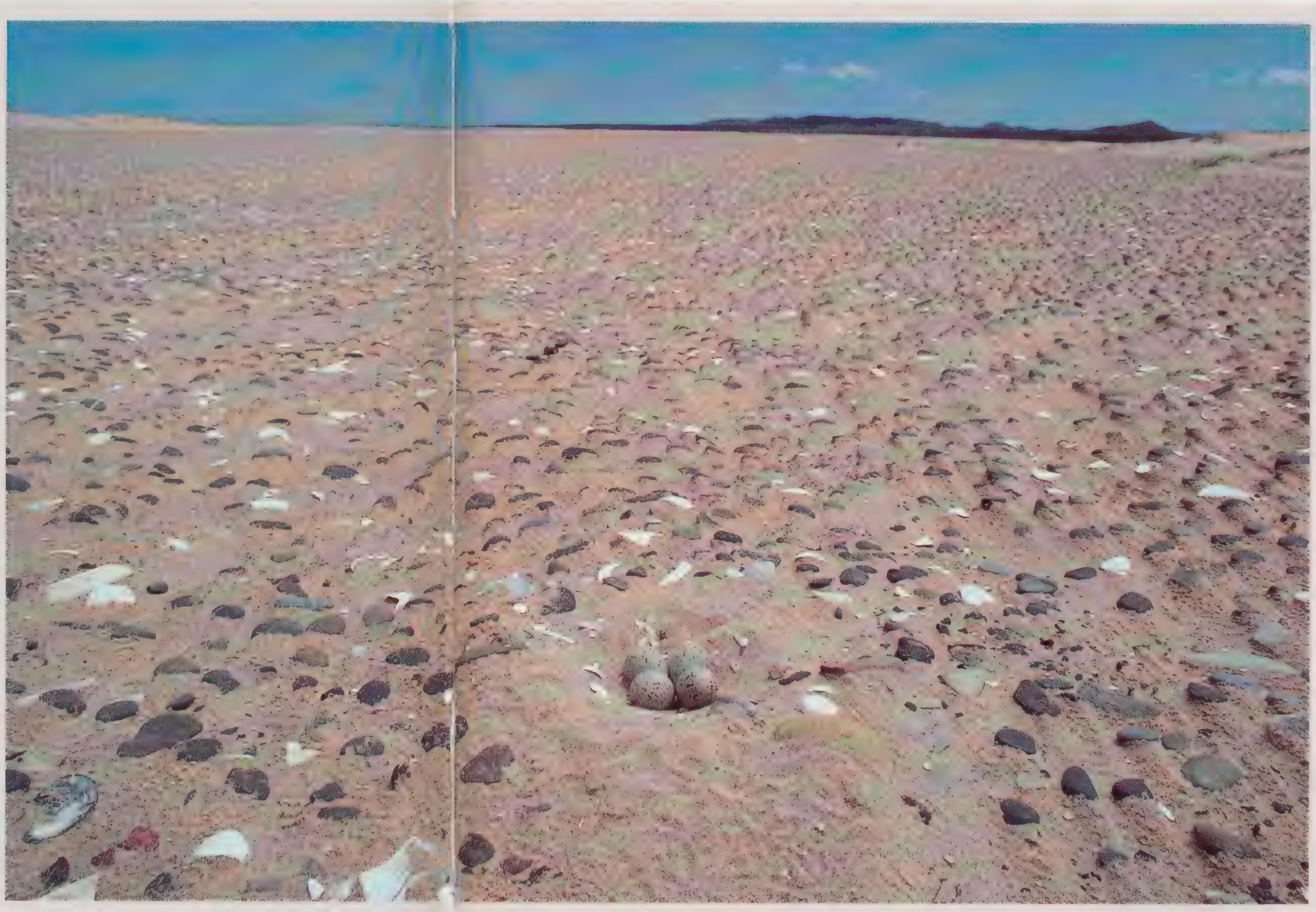
The Madeleine Islands on this morning in early June are a world of rain, of sky-water falling from clouds fat at the heaven end, thinning into drizzling fog, mist. The car windshield wipers breathe monotonously, "Heehaa heehaa heehaa."

The tires pussyfoot around puddles, ponds, moving roads of red mud that flush up sand and rain the age of Earth. Ocean is evident everywhere on the islands: a rock-core and mudsand boat anchored in the Gulf of St. Lawrence due north of Nova Scotia and Prince Edward Island, a duned sand string with here and there a knot of stunted conifers, a far-off, windbeaten, undersea plateau, its elongated head sticking out of the gray saltsea. The car crunches to shore, slowly stopping on the frangible surface.

The sea is always the same, relentlessly changing: rolling up, up, up, pitching down, down, down; rolling up, up, up, pitching down, down, down; the ocean lulls, beckons, nurtures, or attacks with wave, with wind, a foam wildness tossing itself onto a short, flat shore with rock, weed, wood, shell, tiny crustacean and bug. Sloping farther from the shoreline are dry, orange-brown sand dunes, bald but for occasional tufts of long, windblown grasses.

This slice of beach is peppered with pebbles—grays, grays veined with white, whites flecked with black—mineral mimics of plover eggs. Somewhere in time the countenance of stone and egg converged, a masquerade that often hides too well the delicate shell. And if eggs look like pebbles, then adults assume an aspect "as pallid as a beach flea or a sand crab," said Roger Tory Peterson.

The piping plovers of Îles de la Madeleine should be back by now. Each spring they fly north from their winter retreat to forage the nourishing shore, scrape out a slight hollow on the flat of the beach, lay four eggs that disappear among the cool stones, and incubate and rear their sand-gray chicks.



JOHN SIDLE (2)

Far left, portrait of a piping plover as a threatened bird. Left, plover eggs in their spare hollow seem lost among the stone-strewn sands of the Madeleines.

I remove myself from the warm car and begin to trudge up the beach. Jacket buttoned to the neck, camera bulging under woolens and down, shoes damply inadequate, I scan for a moving stone, a piping plover. A 1987 Canadian Wildlife Service census of the islands yielded 78 birds, including 37 breeding pairs. The rest are gone—from the Côte-Nord of the St. Lawrence, from baie des Chaleurs, leaving Îles de la Madeleine the sole remaining breeding area in Québec. Only in Newfoundland are plovers farther north. Can I spot the speckled eggs on a field of impostor speckled eggs? Cautiously I navigate the sand, swiping souvenir rocks and shells along the way. Every step I scrutinize, so simple is it to miss and crunch a nest. The longer I walk, the bigger the beach—or is it the pockets sagging with stones, the aching limbs, the wind winding through the mounds of cloth?

Then, a motion flicks at the corner of my eye—a leaf sweeping higgledy-piggledy in the wind? A ball rolling across the shore? A young gull? No, a piping plover running, feigning injury in frantic defense of its nest against the approaching Colossus. The bird is smaller than I had imagined, a killdeer without sinew, feathered in an unusual pale green. Its plaintive *peep-lo* is persistent but soft in volume. The whole creature emanates softness, fragility, all the more because I know it is endangered.

I stand spellbound, indulging my need to fill up with the bird, forgetting the rain, the legs, recognizing that the small shorebird and perhaps all the birds within the species are struggling to survive against summer invasions of beach balls, bathers, campfires, dune cycles, and numberless other disturbances humans make and human machines make for them.

My eyes pick out the nest, a textbook nest, a modest depression in the sand containing four speckled eggs. A peek, a photo, and I am gone, the adult immediately resuming its nestseat, hunkering tight, its body warmth baking the next generation.

As I drag myself back to the car, thoughts crackle. Is this the plovers' penultimate generation? The last? The plovers know nothing of this. The Canadian Wildlife Service, though, is roundly fighting back, planting signs, posters, distributing from racks and shelves brochures that cry out to leave alone *les pluviers siffleurs des Îles de la Madeleine*, and allow them to continue the work of their species.

—Jill Crane

BHL

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Below, water explodes as Wiens races to catch a plover chick on Pine and Curry Island at Lake of the Woods, Minnesota. Above, Wiens attaches USFWS and color bands that will identify the bird if it is sighted. Far right: At last, the hard-won victory. The piping plover attained endangered or threatened status throughout its range in December 1985. An example of the power of federal protection: in 1985 about 500 pairs nested on the U.S. Atlantic coast; 1989 saw around 700 pairs.

JOHN SIDLE (2)

hicle tracks, and other intrusions set against a backdrop of bridges and port facilities. Over the years human disturbance probably caused the plover population to decline from 10 to 12 breeding pairs to one or two. I heard a plover's melodious *peep-lo*, mixed in with the sounds from ship winches and gulls. The bird was 100 yards away and its mate did a flyby, beating its wings and banking toward the water. Their nest was probably in a patch of gravel and sand nearby.

Next I drove to Lake of the Woods on the Canadian border to look for plovers in a more natural setting. I was met there by Terry Wiens, a graduate student from the University of Minnesota who was studying plover reproduction. We boated to the western end of a forested island and peered across at a beach where adult piping plovers and chicks scurried about.

Terry had long been capturing and banding piping plovers, and I was about to ask him to demonstrate his techniques when he slipped into the water with a bucket over his head and treaded toward shore. Apparently plovers don't pay much attention to floating buckets. Terry was intent on a single plover chick crouched next to some wormwood. Suddenly, water exploded. Plovers scattered, and Terry darted onto the beach, raced to the chick, planted the bucket over the wormwood, reached underneath, grabbed the chick, ran to the water, and swam to the boat, bucket right side up with chick inside.

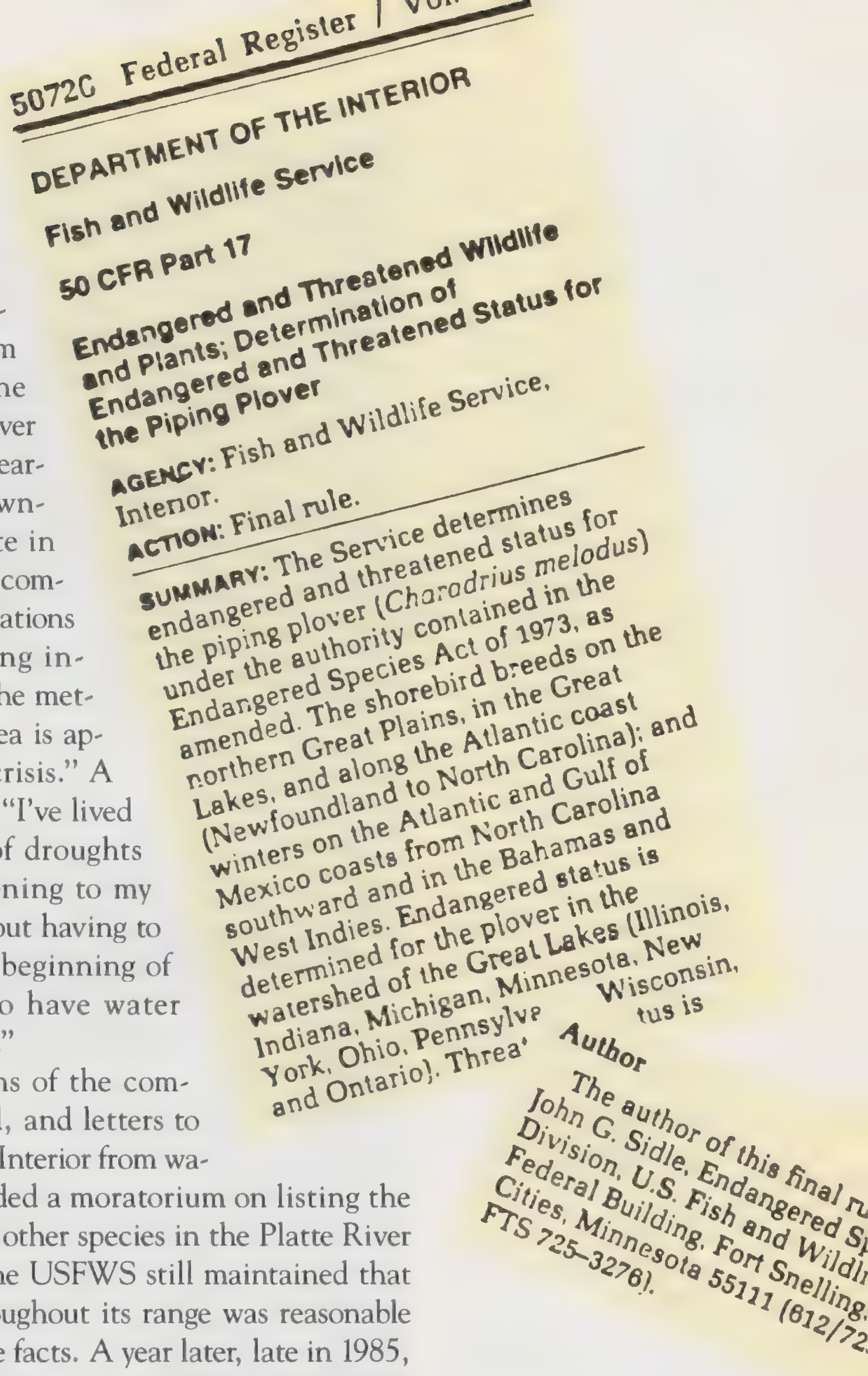
We attached USFWS and color bands to the 10-day-old so that it could be identified if it were later sighted. Banding allowed Terry to monitor important indicators of the plover's health such as reproductive success—the percentage of chicks that fledge. Success can vary widely from year to year, but in some parts of the plover's range it remains low year after year because of human disturbance at beaches or chick-drowning discharges of water from dams. Predation is another factor. The predator community has changed at plover breeding sites. Human settlement and its trash have attracted and increased the numbers of foxes, skunks, raccoons, gulls, and other egg and chick eaters.

Resightings of banded birds such as Terry's have revealed that most adult birds return to the nesting area of the previous year. At Lake of the Woods 70 percent of adult birds banded in 1982 and 35 percent of banded juveniles returned in 1983. This suggests that if we acquire and protect plover nesting grounds we can expect the breeding occupants to return year after year.

When I returned to my office I found on my desk some late-breaking information. Several states on the Atlantic coast, New Jersey and Virginia among them, had just added the piping plover to their state endangered species lists. Volunteer plover wardens were patrolling Connecticut beaches and elsewhere to entreat the public to avoid nests and chicks. A consortium of federal, provincial, and private conservation agencies in Canada were considering endangered status for the species. Canada has viewed the bird as threatened since 1978. Now, summer 1983, the piping plover's overall status in North America warranted listing. I submitted a draft of the proposed rule to our Washington office where it remained for eight long months. Many government officials, including those in the Office of Management and Budget, and a parade of lawyers, were involved in the review process. At each tier, a signature of approval had to be obtained, and on the cover sheet I had written more than 20 names.

The process was particularly prolonged because of the plover's extensive range. Most proposed listings involve species with a small range. I had to send a map showing the counties where breeding or wintering piping plovers occur or might occur. That turned out to be most of the counties on the Atlantic and Gulf coasts. I also noted that the piping plover occurred near petrochemical complexes, on crowded beaches, and near dams. Some reviewers might have seen potential conflict there, but such considerations are not supposed to enter into the decision. It must be based on only the best available data on the species.

November 8, 1984, was an important day for the piping plover: the rule proposing endangered status appeared in the *Federal Register*. Seeing it there, alongside regulations for Housing and Urban Development and the Federal Aviation Administration, I realized that no one could have known what went into its publication. It was just another rule. Nevertheless I pressed on, following the rest of the listing provisions. I sent the proposed rule to all the counties where the plover was believed to occur and arranged for a public notice of the proposed rule to appear in 56 newspapers from *The New York Times* to the *Jamestown Sun* in North Dakota. The public had 60 days to submit written comments and 45 days to request a public hearing where the USFWS would ad-



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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Determination of Endangered and Threatened Status for the Piping Plover

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service determines endangered and threatened status for the piping plover (*Charadrius melodus*) under the authority contained in the Endangered Species Act of 1973, as amended. The shorebird breeds on the northern Great Plains, in the Great Lakes, and along the Atlantic coast (Newfoundland to North Carolina); and winters on the Atlantic and Gulf of Mexico coasts from North Carolina southward and in the Bahamas and West Indies. Endangered status is determined for the plover in the watershed of the Great Lakes (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylva Wisconsin, and Ontario). Threa tus is

Author

The author of this final ru John G. Sidle, Endangered Sp Division, U.S. Fish and Wildli Federal Building, Fort Snelling, Cities, Minnesota 55111 (612/72 FTS 725–3276).

dress comments and questions about the proposed rule.

Letters began to pile up on my desk. The many responses included letters of support, a few with substantive data about the piping plover. Christopher McKeever of Long Island, New York, wrote about the plover's decline on Long Island and the tremendous increase in bathers and vehicles, balloon-tire motor bikes racing over beaches and flats. McKeever mentioned his friend LeRoy Wilcox who conducted the first detailed study of the piping plover from 1937 to 1958. A 1939 paper by Wilcox does not mention human disturbance.

I heard from plover supporters from Nebraska who warned that I would soon be contacted by water development interests in the Platte River Basin where the bird breeds. A few dams had been proposed on the North and South Platte rivers in Colorado and Wyoming, and dam proponents were worried about a little bird blocking the projects. They had had a taste of the Endangered Species Act when their projects were blocked by the whooping crane. They believed that pro-plover people would claim that the dams would restrict or eliminate the flow of water to the piping plover nesting habitat downstream. Other water developers feared that the bird might interrupt plans to divert water from the Platte for irrigation.

The Platte River Basin had been the site of controversy for USFWS and other parties for many years, so when a calm, professional voice on the telephone identified himself as a lawyer representing a certain Nebraska water interest I wasn't too surprised. He wanted to double-check the procedure for requesting a public hearing to comment on the proposed listing. I explained the procedure and added that the USFWS was not on trial, therefore, cross-examination would not be allowed.

Public hearings became hot items as more water interests demanded them. Hearings were requested in Colorado and Wyoming and the comments opposing the listing eventually filled two large binders. This was the sole opposition, but we had to extend the normal 60-day comment period numerous times to allow the water interests to have their say. To demonstrate support and solidarity, water management districts and water departments along rivers not associated with the Platte River Basin commented against the listing. All opposed the listing on the grounds that not enough data were available to support listing, or because it would interfere with state and local water rights.

I arranged a public hearing at the Denver City Council chambers. I sensed the power in the room as attorneys and representatives of water interests arrived. Future USFWS director in Washington, Frank Dunkle, sat in the audience. A lawyer for the Denver Water Department testified first. As expected, he claimed that sufficient data and analyses were not available to support listing the piping plover as threatened or endangered in the northern Great Plains. Economic factors were imperative, he insisted. Water-poor Denver was planning the billion-dollar Two Forks dam and reservoir on the South Platte River over 400 miles from the nearest piping plover downstream on the Platte in Nebraska. A typical comment: "The ramifications of what you're doing include the fact that the metropolitan Denver area is approaching a water crisis." A Coloradan testified: "I've lived through a couple of droughts and I grew up listening to my father tell stories about having to fill bathtubs at the beginning of the day in order to have water through the day . . . ."

Further extensions of the comment period ensued, and letters to the Secretary of the Interior from water interests demanded a moratorium on listing the piping plover or any other species in the Platte River Basin. In the end the USFWS still maintained that listing the bird throughout its range was reasonable and supported by the facts. A year later, late in 1985, the piping plover was listed and codified in *Part 17 Title 50 Code of Federal Regulations.*

In 1989 the piping plover population stood at about 4,000, almost the same as the estimated 4,300 birds at the time of listing. I am now a "recovery" biologist working on the conservation of the piping plover in Nebraska and carrying out the recovery provisions of the Endangered Species Act. Two Forks dam has not been built. People are not filling their bathtubs, except to clean themselves.

Extinction is forever and each day, scientists say, several species depart this world. In the two years it took Uncle Sam to list the piping plover, how many species did the Earth lose? The government's regulatory process can't keep up with the deadly pace. In 1918 we could simply outlaw the slaughter of migratory birds by unilaterally passing the Migratory Bird Treaty Act. Protecting diminishing species, and habitats owned by millions of people all with personal agendas, is quite another matter. □

John Sidle is a biologist with the U.S. Fish and Wildlife Service in Grand Island, Nebraska.

Further Reading

Atlantic Coast Piping Plover Recovery Plan. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts, 1988.

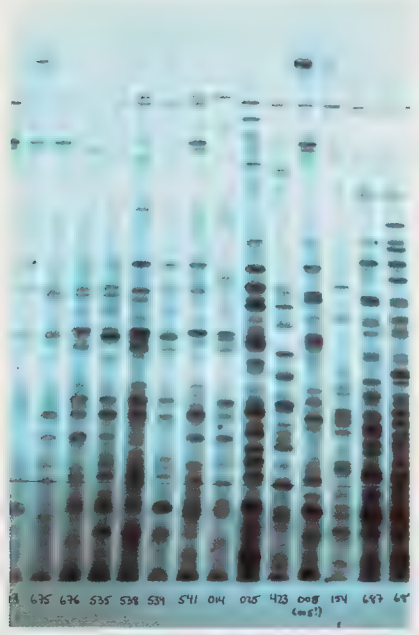
Great Lakes and Northern Great Plains Piping Plover Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, Minnesota, 1988.

WHEN MONOGAMY ISN'T

David F. Westneat and Paul W. Sherman

TIM MOERSH (2)

Once scientists thought our garden birds were paragons of sexual fidelity. But it isn't so. Cornell researchers David Westneat (right) and Paul Sherman used a technique called gel electrophoresis to identify mismatched broods: songbird chicks whose father is not their mother's pair-bonded partner. Far left, DNA fingerprinting is an improved method for identifying a chick's real parents.



You are out for a stroll in a woodlot in early June. The air is calm, the sun warm, and the sounds and smells of spring are everywhere. Today you resolve to be especially observant, because many birds are beginning to nest. You expect to see some pairs courting and others searching for nest sites or building. Little do you suspect that you are about to witness an event that is causing a revolution in the way ornithologists view avian mating and parental behavior.

Your expectation of seeing males and females consorting in pairs is reasonable because monogamy is widespread in birds. Indeed, Dr. David Lack of Oxford University, who was one of the leading ornithologists of the 20th century, wrote in 1968, "in 92 percent of all birds, one male and one female form a pair and raise a brood together, [a behavior that is] conventionally termed monogamous." Lack, like the rest of us, assumed that the pair bond between a male and a female reflected an exclusive mating relationship. Not so. Today, barely 20 years later, we are learning that monogamy is not always what it seems. The behavior you are about to see has contributed to this change in perspective.

Continuing your walk, you approach a raspberry thicket in a field next to the woodlot. Hearing a distinctive double-noted song, you swing up your binoculars and focus on a stunningly blue male indigo bunting. "He's defending his territory," you think, reflecting on the irony that such a beautiful song signals a defiant "keep out" to other males. Standing quietly so as not to disturb the singer, you notice movement in the raspberry canes. A light brown bird, a female bunting, is busily carrying dried grass into the thicket. "A pair is setting up housekeeping!" you think. "I ought to come back to see the eggs."

You turn to go. Suddenly, out of the corner of your eye, you see a blue streak swooping toward the female. She drops the grass and dives pell-mell into the thicket, giving staccato alarm calls. The blue streak, a second male bunting, pursues her closely. You hear wings flapping and more alarm calls; although you frantically scan with your binoculars, you can't see what's going on. The male who had been singing in the trees above drops like a stone into the brush. Silence. Then more alarm calls, more fluttering, and the two males burst from the thicket and swoop down the tree line. One of them finally turns back, lands above the female, and bursts into song.

You linger a while, hoping for a repeat performance or some additional clue as to what just happened. But everything has returned to normal: the female is collecting nesting material and the male is singing. You walk on, turning over the puzzle in your head. Why did that second male swoop at the female? And what happened in the raspberry thicket?

Some answers to your questions can be found in a totally different setting. You are visiting a genetics laboratory at Cornell University in Ithaca, New York. A scientist peers quizzically at a series of brown smudges arrayed across an envelope-sized quarter-inch-thick slice of gelatinlike material. He is using a technique called electrophoresis to identify proteins that have different physical characteristics. The technique makes it possible to see genetic polymorphisms, natural variations in proteins that are inherited from one generation to the next.

Genetic polymorphisms are sometimes highly visible: eye color and hair color are familiar examples in humans. The scientist you are visiting is studying more subtle variations, differences in the proteins found in the blood of birds that are much like human blood types. You can't see these differences in blood proteins by simply looking at the birds, but the electrophoresis technique reveals them.

The Cornell scientist is puzzled. He has analyzed blood samples from a pair of white-crowned sparrows and their brood of four chicks. He expected that the chicks would have inherited the blood proteins of their parents. Oddly, though, two nestlings seem to have protein variants that are different from those of the adults. How have these two nestlings acquired novel protein types?

The scientist carefully rechecks the numbers on the sample vials. None has been mislabeled. If blood proteins are inherited, how can a chick have a protein variant that its parents do not? A new mutation is a possibility, but mutations occur very rarely—less than one in 100,000 individuals. "What kind of hanky-panky is going on here?" the biologist mutters to himself. At first this explanation too seems unlikely. But when blood samples from other broods have been analyzed, the evidence seems indisputable: many white-

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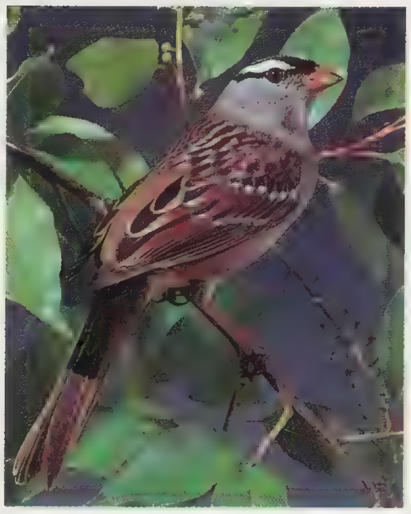
ROGER WILMSHURST (BRUCE COLEMAN LIMITED)

Males of most North American songbirds seek out extra-pair copulations, including the indigo bunting, right, and white-crowned sparrow, below. Males benefit from their unfaithful behavior, siring additional offspring without doing any extra parenting. The benefits to females are more subtle. In some species, such as chickadees, females seem to solicit EPCs, but others, such as the mallard above, usually resist the advances of a nonmate male.

MIKE HOPIAK



crown chicks are not the biological offspring of at least one of the adults that fed them.

Research at field sites and in laboratories around the world has revealed similar mismatches between adults and chicks in other bird species. Intrigued by these phenomena, we teamed up to try to understand them. David Westneat noticed the unusual indigo bunting behavior described in the opening scene while in southwestern Michigan and followed up his field observations with electrophoretic analyses of paternity. Paul Sherman became interested in white-crowned sparrows as a sidelight to a different study—of ground squirrels in California—and along with Dr. Martin Morton of Occidental College, investigated sparrow parentage, also using electrophoresis.

The results of our independent analyses astounded us. In both buntings and sparrows, about 33 percent of the chicks were not the offspring of at least one of the attending adults. Over 40 percent of all nests contained at least one mismatched chick. We wondered whether or not these mismatches could have resulted from brood parasitism, that is, females laying eggs in the nests of others. But our observations indicated that brood parasitism rarely occurs in buntings and white-crowns. We concluded that the parent/chick mismatches were the result of a female copulating with a male other than her pair-bonded mate.

Scientists call sexual liaisons that involve a male or female other than the bird's pair-bonded mate "extra-pair copulations" or EPCs. EPCs are widespread: they have now been observed in more than 150 bird species and-in all the avian families. New reports appear in nearly every issue of the professional journals. The behavior has been reported in species as diverse as common guillemots, house sparrows, rock ptarmigan, white ibis, bank swallows, eastern bluebirds, snow geese, bobolinks, mallards, and starlings.

Not only are reports of EPCs increasing, but studies of the consequences of such behavior are beginning to appear. Many of these studies show that a substantial proportion of offspring are conceived in EPCs. For example, in addition to buntings and white-crowns, an estimated 24 percent of pied flycatcher chicks, 24 percent of barn swallow chicks, 23 percent of red-winged blackbird chicks, and 15 percent of bobolink chicks are not sired by their mother's social partner.

The study of extra-pair copulations has dramatically altered scientists' perceptions of avian mating systems. It can no longer be assumed that the social bond between a monogamous pair reflects an exclusive sexual relationship. Scientists must now answer a whole new set of fascinating questions about the evolution of courtship behavior, the choice of mates, mating behavior, and parental care.

We are particularly curious about the advantages and disadvantages for each sex of engaging in EPCs. The reasons it is important to understand the benefits and costs of EPCs hark back 130 years to Charles Darwin. Darwin's theory of evolution by natural selection applies not only to morphological attributes like plumage color or leg length but also to behavior. According to Darwin, individuals alive today are descendants of those who reproduced most effectively in the past. This means behaviors that persist and spread must have some function that leads to increased survival and reproduction of their bearer. Regarding EPCs, we must ask: What are the benefits of courting, consorting, and eventually pairing with one partner, only to copulate later with another?

For male birds the benefits seem relatively straightforward: a male who engages in EPCs sires more offspring. Furthermore, the chicks he fathers will be in different nests, so he is less likely to lose all his offspring to predation. And the male boosts his repro-

ROBERT C. SIMPSON (VALAN PHOTOS)

ductive success without doing any extra parenting; some other adults expend the energy to feed, shelter, and protect the extra-pair chicks. Because of these benefits males in most species of birds attempt EPCs whenever possible.

But male birds pursue EPCs only under specific circumstances. For example, in social gulls, terns, and ibis, apparently few offspring are conceived in EPCs. This may be because females in these colonially nesting species all are fertile at about the same time. To complete an EPC, a male would have to leave his mate's side, running the risk that she in turn would be courted and inseminated by another male.

In contrast, it appears that males of most North American songbirds frequently pursue EPCs. Unlike the colonial species, many songbirds do not breed synchronously. Thus a male indigo bunting may copulate with his own mate, then thwart the sexual advances of other males by guarding her; later, after incubation has begun and further copulations with his female will not result in fertilizations, the male stops guarding her and pursues EPCs with neighboring females.

Male songbirds such as the indigo bunting behave as if they were balancing the costs of EPCs against the benefits. Although opportunities for EPCs probably remain fairly constant until nearly the end of the breeding season, once the eggs have hatched many males switch from pursuing EPCs to feeding and defending chicks. Switching may be favored evolutionarily because the benefits of paternal care outweigh the benefits of attempting EPCs when needy nestlings are present.

Now let's consider EPCs from the female's perspective. Unlike males, females cannot produce more offspring by mating with several partners. The benefits to females must be more subtle. One possibility is that a female receives additional courtship feedings or assistance in rearing chicks from an extra-pair mate. We have never seen this happen in indigo buntings or white-crowns, however, and reports of such behavior in other monogamous birds are rare. Another possibility is that a female engages in EPCs as a hedge against the risk that her mate is sterile. By copulating with another male, the female ensures that her eggs will be fertilized.

We think the most likely and intriguing possibility, though, is that the extra-pair male is in some way better than the female's pair-bonded mate. Differences in the size, health, or vigor of males might be inherited and so translate into differences in the quality of offspring they sire.

For example, in white-crowned sparrows a food-rich nesting site that is safe from predators is extremely important. A good way for a female to find such a site is to return to the place where young were reared successfully the previous year. A female returning in the spring might settle on a familiar territory, only to be joined by a new, less powerful or attractive male if her mate from last year died over the winter. Engaging in

THE OTHER EIGHT PERCENT

Accept for the moment the contention of noted ornithologist David Lack that 92 percent of bird species are monogamous — uh, most of the time. Extra-pair copulations aside, in a majority of the species that have been studied a single male and a single female establish a pair bond — an exclusive reciprocal commitment — in order to raise their young jointly. It's a system that works well for tree-nesting birds with helpless young requiring solicitous parenting.

But what about the other 8 percent? Bird mating systems are wondrously varied. Lack groups them into three categories: promiscuity (6 percent of all species); polygyny (2 percent); and polyandry (less than 1 percent).

One of the most curious examples of polygyny, in which a male forms pair bonds with more than one female, is seen in the African ostrich. The male typically assembles a harem of three, of which one is his favorite. After each female lays up to 10 eggs in a large sandy pit he has excavated, the male incubates the whole big batch, with a little help from the preferred female.

Polyandrous behavior turns stereotypical male and female sex roles upside down. Consider the Indian pheasant-tailed jacana, a marsh-dwelling, ploverlike bird. Typically, a female mates with one male, lays her four eggs in the floating nest he has built, then moves on to another mate. Ultimately she may leave up to four fathers brooding different clutches. It's an effective way for a female to boost her reproductive output, especially if she comes back for a second round later in the breeding season.

Although polygynous and polyandrous species do establish pair bonds for a brief period, promiscuous birds just mate and depart. Ornithologists have noted this behavior in some hummingbirds, grouse, and ducks, to name a few. Both parents may also forsake the young: not only does the male whydah (pronounced "widda"), a type of African weaver-finch, desert the female, but she goes on to lay her eggs in the nests of other birds.

Hans D. Dossenbach, describing this behavior in *The Family Life of Birds*, can perhaps be forgiven for calling the bird "the Merry Whydah." Faced with titillating tales of extra-marital relations, multiple partners, and maternal abandonment, it's tempting but unwise to devolve human morals on avian behavior. When monogamy isn't, it's for a very good reason; natural selection favors mating strategies that produce as many offspring's offspring as possible. The three alternatives to monogamy are particularly good strategies for ground-nesters that have precocious, self-feeding young. A single parent can make it alone.

—C. B.

ROGER WILMHURST (BRUCE COLEMAN LIMITED)

If a female barn swallow has copulated with other males, her mate later cuts back on feedings to nestlings—perhaps to limit his investment in chicks that may not be his own. Can this barn swallow tell which chicks were fathered by an intruder? The authors are testing whether red-winged blackbird fathers preferentially feed their own young in a genetically mixed brood.

EPCs with the best male in the area might be the female's strategy for providing her offspring with a high-quality sire as well as a safe, energy-rich place to grow up.

Dr. Susan Smith of Mount Holyoke College in Massachusetts has some evidence that supports this idea. She saw female black-capped chickadees leaving their mate's territory to solicit EPCs with neighboring males. Smith had been observing the chickadees' behavior throughout the year, so she knew the winter social status of the males in her study population. She noted that females paired to low-ranking males sought EPCs with males that had ranked higher in winter flocks. We hypothesize that some trait (like body size) that enables a male chickadee to be dominant can be inherited. So, by copulating with a dominant male, a female increases the likelihood that her offspring will also be dominant and have better access to winter food supplies.

Not all female birds behave as if EPCs are beneficial to them. Recall that during your walk you saw the female indigo bunting flee from the male intruder; this is a typical response by female buntings to attempted EPCs. And you may have seen female mallards in the spring violently struggling to avoid EPCs. Occasionally a female duck is seriously or even mortally injured when several males sexually assault her simultaneously. In both of these species EPCs might occur not because the females benefit but because it is more dangerous for females to resist than to submit.

Females and males also differ in the reproductive costs they suffer if their mate engages in an EPC. Males can be expected to go all out to prevent their mate from copulating outside the pair bond, but not vice versa: extra-pair fertilizations have more negative reproductive consequences for males than females. A female can be certain that the eggs she lays are her own, but a male can't be certain whether the eggs laid by his mate were fertilized by him. Males whose mates engage in EPCs could end up squandering time and energy feeding and protecting chicks sired by some other bird.

Indeed, male bank and barn swallows, purple martins, mallards, and starlings sequester their mate just prior to and during egg-laying. They aggressively defend their female from any approaching males, and even attempt to herd her away from them. Should an EPC occur, males in some species, including indigo buntings and common guillemots, immediately attempt to copulate with their mate. These repeated inseminations can dilute the intruder's sperm, thus improving the probability that the pair-bonded male will sire the chick.

Males do not stop there. Recent evidence suggests that males assess their likelihood of paternity — perhaps by keeping track of the frequency of territorial intrusions or by observing their mate's sexual activities — and adjust their behavior accordingly. Dr. Anders Møller of the University of Uppsala, Sweden, reports that male barn swallows fed chicks less often if their mate participated in EPCs than if she did not. Similarly, yearling male indigo buntings, who are about twice as likely as adults to be cuckolded, seldom assist in rearing chicks.

Males may even recognize and preferentially assist their own young in a brood of mixed paternity. We are investigating this hypothesis in red-winged blackbirds. In collaboration with Dr. Anne Clark of the State University of New York at Binghamton we are videotaping feeding visits by male red-wings, identifying which chicks they feed, then analyzing paternity to see if those chicks were sired by their caregiver.

Once scientists and laymen thought that our garden birds were paragons of monogamy and sexual fidelity. But it isn't so. We can no longer simply assume that because a male and a female are paired they mated exclusively with each other. The fascinating implications of extra-pair copulations in birds have heightened our sense of wonder at the complexity of bird behavior.

We encourage you to watch your backyard birds carefully as they establish territories, build nests, and rear their young. You might just see some unusual behaviors — interactions that are comprehensible only by knowing about extra-pair copulations, the situations when monogamy isn't. □

David Westneat is a research associate in the Section of Genetics and Development at Cornell University. As of August 1990 he will be an assistant professor at the University of Kentucky. Paul Sherman is an associate professor in the Section of Neurobiology and Behavior at Cornell.

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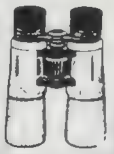

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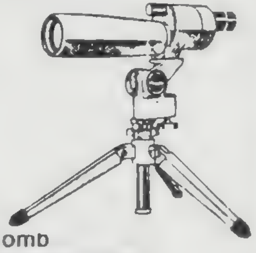

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ROCK-A-BYE BIRDIE

John V. Dennis

A stone for a baby. In ancient times perhaps a Greek or Roman boy climbed to an eagle's nest and found a stone there. He picked it up. It rattled. The story of the eaglestone passed to Pliny the Elder who recorded that eagles place them in their nest to effect reproduction. By the 18th century pregnant woman were wearing them near their navels to facilitate delivery. Left, a magic stone may be hard to find, but trash is omnipresent. Hal H. Harrison photographed this impressionistic wood thrush nest of toilet paper, a gum wrapper, tissues, plastic wrappers, and soiled rags.

During the course of evolution bird nests have gradually changed from a slight depression in the ground to elaborately woven structures such as that of the oriole. Sticks and twigs compose the foundation of many bird nests, then finer materials are added to form a cup where the eggs are laid; moss, plant down, shredded bark, and dry grass are commonly used as nest lining. Despite the similarities in construction, a nest is so characteristic of its owner that we usually can identify the species that built it.

Besides the basic twigs and grasses, some birds gather additional nesting materials that seem to serve a specific purpose. Recent research theorizes that birds of prey set plant sprigs in the nest for sanitation, the cooling effects, and the supposed benefits of ridding the nest of parasites. Purple martins also bring green leaves during egg laying and incubation. I've found fresh yarrow in a house sparrow nest and seen starlings carrying off the green leaves of shasta daisies. Klaus Immelmann in *Australian Finches* has claimed that charcoal absorbs moisture from the feces of nestlings. Immelmann reports finding 50 to 150 charcoal pieces in the nests of masked finches.

In recent years, persons studying the life histories of birds are finding all sorts of unexpected objects in nests. It appears as though birds are taking advantage of human junk and are constructing their nests out of artificial materials. Take the examples of John K. Terres in his *Encyclopedia of North American Birds*. He tells of a canyon wren in California whose nest was built of office supplies — paper clips, rubber bands, thumbtacks, and paper fasteners. He also mentions a white-necked raven nest in California constructed entirely of barbed wire.

Purple martins not only nest in manmade houses, they fashion their nests with manufactured objects. In *Attracting Purple Martins*, J. L. Wade tells of a purple martin nest in Louisiana made of pull-tabs from aluminum cans, and a nest in Quebec constructed of steel nails. Arthur Cleveland Bent, in his *Life Histories*, writes about a purple martin nest constructed of pieces of rubber insulation.

Paper products are probably the most popular manmade nest material. I am indebted to Jean Bancroft of Winnipeg, Canada, for telling me of a blue jay's Kleenex and toilet paper nest. I myself observed a blue jay flying off with a Kleenex in its bill, but the tissue was so soft that most of it disintegrated before the bird reached its nesting site. Hal H. Harrison, author of *Field Guide to Birds' Nests*, tells of a wood thrush nest and many loggerhead shrike nests containing tissues, newspaper, or paper towels. And Terres mentions not only a warbling vireo nest in California built of tissue, but a house sparrow nest that contained 1,282 manmade items, including a piece of a letter and envelope, candy wrappers, cellophane, twine, and cigarette filters.

The tobacco industry is an important provider of nesting material; birds use cigarette filters, butts, and cigar wrappers. Hal found a western kingbird nest in Arizona made largely of Marlboro butts, and a gray catbird nest that contained cellophane wrappers from three cigars.

To observe a bird flying off with a cigarette in its bill is an unusual experience; this happened to me when I visited Wembley, England, in 1983. But birds carrying lighted cigars or cigarettes may be dangerous. In a 1959 issue of the Australian publication, *The Emu*, Alec H. Chisholm tells of a brush fire started by a lighted cigarette that a diamond sparrow carried to its nest.

In rare instances paper money or other valuables also wind up as nesting material. Terres reports a brown thrasher in Minnesota with a five-dollar bill in its nest. A Jackson, Tennessee, newspaper printed a photograph of a nest with a five-dollar bill worked into it. Something not to become too excited about was a one-dollar bill neatly folded at the bottom of a purple martin's nest; but Wade reported the finding of a sensational object in Kansas—a diamond ring apparently dropped by a purple martin bringing material to a martin house.

Purple martins and many other bird species are fastidious about removing fecal sacs from the nest, yet birds construct their nests with some of the most ill-

J. LICHTER (PHOTO RESEARCHERS, INC.)

smelling substances. Morris D. Cunningham, a purple martin landlord in South Carolina, writes to me that his birds build with a mixture of cow manure and mud; one pair used undiluted cow manure. According to Bent, rough-winged swallows apply "vile-smelling" moist horse dung to their nests. Not to be outdone, burrowing owls line their ground-nest tunnels and chambers with dry horse dung or cow chips. The white stork, which according to European folklore brings human babies to their parents, is not a tidy nest builder. In Grzimek's *Animal Life Encyclopedia* I read that the bird employs rags, newspapers, horse manure, and even clothing snatched from clotheslines in its nests. I wonder if it ever takes diapers.

Nothing better illustrates the attraction of birds to human junk than an episode that occurred off the coast of Labrador. Charles W. Townsend writes in *In Audubon's Labrador* of finding objects in a double-crested cormorant's nest that came from a small ship which sank in 1913. Like salvagers, the cormorants dove to the wreck and brought up such nest decorations as ladies' combs, hairpins, pipes, and pocket-knives.

Why do birds bring these articles to their nests? It is tempting to think that birds collect whatever strikes their fancy, but manmade materials are simply substitutes for the time-honored natural ones. Paper and cellophane, for example, are abundantly available and perform as well as whatever nature offers. Cast-off snakeskin, a popular item woven into many bird nests, is often replaced by cellophane. Hal Harrison does not recall ever seeing a great crested flycatcher nest without snakeskin or cellophane. Whatever purpose the snakeskin may serve, it can hardly be to frighten off snakes: Hal says that great crested flycatcher nests are preyed upon by snakes more often than those of other birds. I have observed that nearly every robin nest in my area has a conspicuous bundle of trash woven into the outer fabric. Like snakeskin, the glittering materials seem to serve no beneficial purpose but cause the nest to be more conspicuous to a predator.

Ours is not the first generation to question the function of strange objects in bird nests. Ancient peoples of the Mediterranean invented the legend of the eaglestone, a stone or stonelike object that birds placed in their nests, supposedly to aid nesting success.

Outside of people who work crossword puzzles, few are familiar with the word "eaglestone." What are they? Where do they come from? What do they have to do with eagles? I asked myself these questions when I began researching eaglestones. The first place I looked for information was a dictionary. "Eaglestone: A concretionary nodule of clay ironstone about the size of a walnut. Ancients believed the eagle took these stones to her nest to facilitate egg-laying." I looked up "concretion": "a nodule of solid matter or a geode." A "geode" proved to be "a nodule of stone having a cavity lined with crystals or mineral matter."

Now that I had a better idea of what an eaglestone looked like, I turned to the history of these strange objects. The earliest reference was by Pliny the Elder (23–79 A.D.), Roman scholar and author of *Historia Naturalis*. In this famous work he recorded what he had heard of eaglestones—that eagles placed them in their nests to effect many cures and that if the bird did not have a stone in its nest, it could not reproduce. According to Pliny, the stones are sometimes in pairs representing the two sexes. Moving from the realm of birds into that of *Homo sapiens*, he advised pregnant women to keep an eaglestone with them to prevent miscarriage. If the stone were discarded as a woman was bearing a child, no birth would take place.

Pliny remained the authority on eaglestones for many centuries after his death in 79 A.D. He probably had firsthand knowledge of geodes; they are common in areas of volcanic activity, and Pliny died in the eruption of Mount Vesuvius.

Today we wonder which eagle can be considered to be the purveyor of the eaglestone; several species are found in the eastern Mediterranean region. The white-tailed sea eagle, which inhabits northern and southeastern Europe, brings seaweed, driftwood, and glass and metal fishing floats to its nest. While banding nestling bald eagles, a closely related species, in Florida in the 1950s, Charles Broley told of a nest containing ears of corn, clothespins, a candle, light bulbs, old shoes, a family photo, conch shells, golf balls, a rubber ball that looked like an egg, and, in a somewhat different category, a pair of pink panties.

Apparently in days gone by almost any eaglelike bird, including the lammergeier, was called an eagle. A large vulture of the mountainous regions of southern Europe, Africa, and central Asia, the lammergeier has the habit of dropping bones on rocks in order to break them open for tasty marrow. Conceivably bones, and even rocks, are found in its nest. But the golden eagle seems like a more suitable candidate. It

Below: Eaglestone imitations sold to the less discriminating. In 1626 Danish naturalist Olaus Worm wrote to an Icelandic friend, "I am most grateful for the stone you sent me, however, it is not an eaglestone, but a sort of seabean." Today, the golden eagle is thought to be the purveyor of eaglestones, having been common throughout much of ancient Europe.

JOHN V. DENNIS

was a fairly common and widespread species in Europe in ancient times.

By the 17th century Pliny's rendition of the eaglestone legend had reached the British Isles and Scandinavia. Writers of that time referred to eaglestones in their work. Without questioning the accuracy of Pliny's account, John Cruden, an 18th century Scottish author of religious books, writes in his *Concordance* of eagles using eaglestones to preserve their nests from poison and to assure egg-laying. He went on to say that pregnant women should wear an eaglestone above or below their navel to help in delivery and prevent abortion.

As the demand for eaglestones in western Europe grew, a shortage ensued. Since geodes have always been scarce, a brisk commerce developed in objects that could pass as eaglestones. Nothing better suited this purpose than hard-coated tropical seeds belonging to the bean family. Smooth, lustrous, roundish, and rocklike, the beans were unfamiliar to the Europeans and their pods rattled when shaken. Capable of floating on the ocean waves for long distances, the seeds sometimes were found on the westward-facing beaches of Britain, Ireland, and Norway, but most of the seeds apparently were brought to Europe by ships as articles of commerce. In 1626 an Icelander named Thorlak Skulason wrote to a Danish naturalist named Olaus Worm, telling him that he had found an eaglestone. He said the stone contained a smaller stone in its stomach and he apologized for not having a male eaglestone.

Worm responded, "I am most grateful, my dear Thorlak, for the stone you sent me, thereby adding considerably to my natural history collections. The one you forwarded under the name 'aeitite' is, however, not an eaglestone, but a sort of sea-bean; I have often heard that people will sell them as an eaglestone."

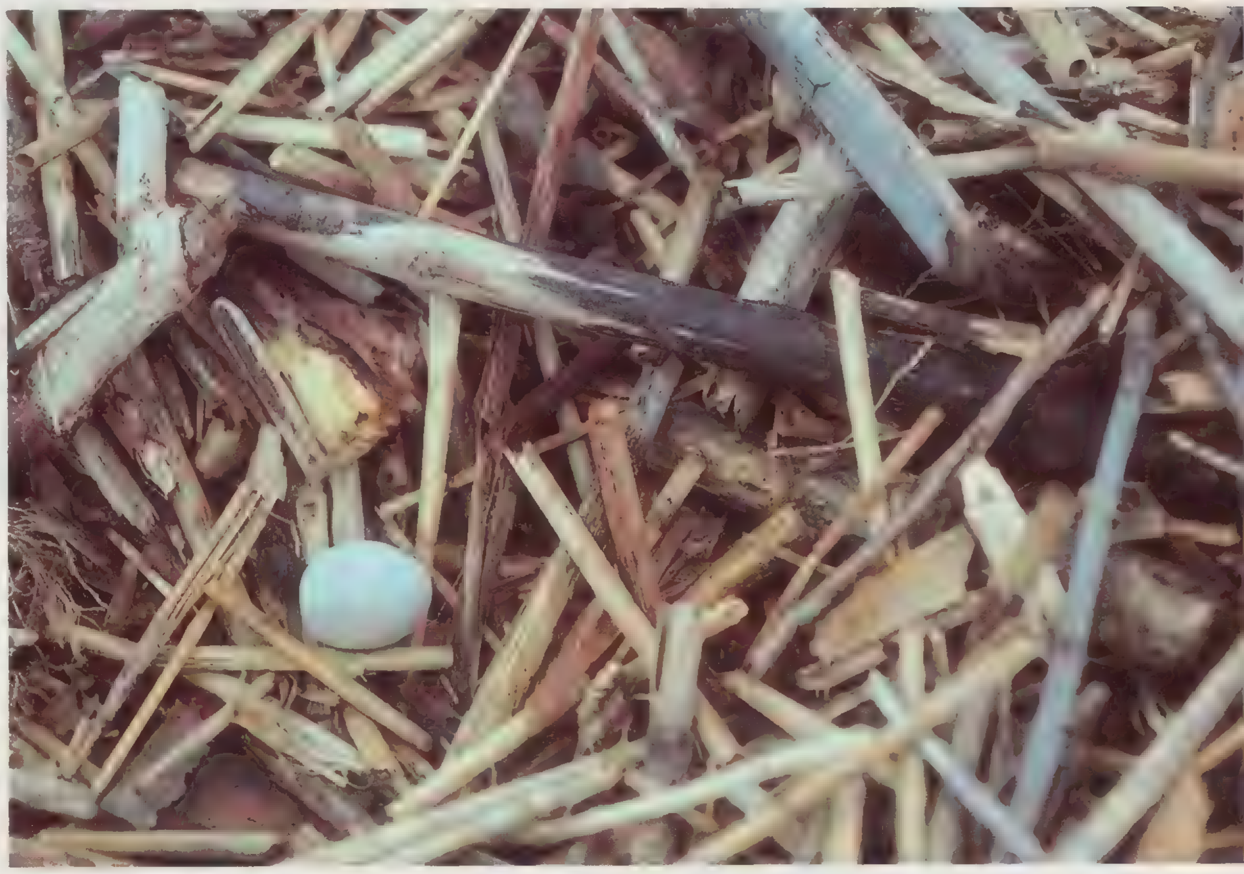
All but lost in the history of eaglestones is the role played by the eagle in initiating the legend. Does evidence exist that an eagle or other bird ever placed stones in its nests? If so, did the stones serve purposes resembling those that ancient people attached to them?

I received a reply to these questions from M. J. Everett, senior ornithologist with the Royal Society for the Protection of Birds, who once researched the golden eagle. He wrote me that he could find no evidence that eagles or any birds of prey bring stones to their nests. He admitted that this might happen occasionally, but that he could find no ornithological truth to the stories. He thought that eaglestones were ironstone geodes, but he did not know how eagles became associated with them. In sum, he called eaglestones an intriguing bit of mythology whose origins are unclear and whose basis in fact is nonexistent.

Even if the stories were true, the eagle might not be the best choice for the eaglestone legend, although the bird's scavenging instinct may account for the association. As chicken farmers know, placing a glass egg in a hen's nest after the real egg is removed keeps the hen busy laying more eggs. Could we draw a parallel to this in wild birds?

A more likely bird occurred to me when I discovered a hickory nut along with two eggs in the nest of a Forster's tern at a nesting colony in Texas. Was the nut a replacement for a lost egg?

Another observation was related to me by Rick Bonney at the Cornell Lab of Ornithology. He told me that common and roseate terns nesting on Falkner Island off the Connecticut coast replaced lost eggs with stones the size and shape of the eggs, and they were incubated faithfully along with the real ones. When I visited Falkner Island after the nesting season in September 1987, I saw no signs of nests and very few terns, but I did step on many small pebbles ideal for a nesting tern. As is so often the case, the old legends do contain an element of truth. As seen in the terns, stones or other hard objects may serve a purpose in fostering nesting success. Ternstone, instead of eaglestone, might be a more appropriate name. □


JOHN V. DENNIS

Nesting terns substitute stones for lost eggs. Is the legendary eaglestone really a tern stone?

John Dennis is a free-lance writer and biologist whose inspiration for this article came from the research he did when Dr. C. R. Gunn and he were writing *World Guide to Tropical Drift Seeds and Fruits*, published by Quadrangle in 1976.

When not writing about esoteric subjects he sticks to more conventional ones like bird habits and bird feeding. His latest book is *The Great Cypress Swamps*, published by the Louisiana State University Press.

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TYPE SPECIMEN

Gustav A. Swanson

Harold Mayfield is unique among American ornithologists. He had no formal biology education except a freshman botany course. For years he studied birds only in the time he could spare from his successful corporate career, and he carried out his research as an amateur without salary or grants. What makes Mayfield's accomplishments extraordinary is the depth and breadth of his contributions. Foremost among these is his work on the Kirtland's warbler, which was instrumental in establishing reserves for the endangered bird.

His many other studies embrace conservation and ecology, behavior and life history, population dynamics, and distribution and abundance. He also has been unusually committed to management and policymaking—he alone has been president of all three top scientific ornithology organizations.

Because of these exceptional achievements, the administrative board of the Cornell Lab of Ornithology has named Harold Mayfield the 1990 recipient of its Arthur A. Allen Award. The award, established in honor of the ornithologist, teacher, popularizer of ornithology, and cofounder of the Lab, is presented to a professional or amateur for broad and outstanding contributions to ornithology. Harold Mayfield certainly qualifies.

Mayfield was born in Minneapolis in 1911 and grew up in Iowa and southern Illinois. He enjoyed studying and graduated top in his class in junior and senior high school. Sports were another interest—for years he never left home without his baseball glove clipped to his belt. He also played basketball and tennis. At Shurtleff College, he graduated *summa cum laude*, edited the college newspaper, was student body president, and starred in several collegiate sports. He received offers to go professional in basketball, but chose instead to take a master's degree in mathematics at the University of Illinois.

After a stint of teaching, Mayfield went to work for Owens-Illinois, a corporation with interests in glass and forest products, plastic packaging, and nursing homes. In his corporate role, he appraised staff performance, selected candidates for advancement, and otherwise dealt with the human side of business. An excellent writer, he published 90 articles in the personnel field, a number of which were very popular. He had a talent for selecting titles that would grip a reader's attention: "How to Be Popular Though Boss," "In Praise of the One-page Memo," and "Executive Selection—How Many Points for Charm?" to mention a few.

So respected did he become that in the early 1960s, Lyndon Johnson appointed him to a presidential committee whose objective was to enlist industry in efforts to provide employment opportunities. Several of Mayfield's publications dealt with equal employment for minorities, an area in which he became a leader. He also lectured in management courses at the universities of Michigan and Chicago and at Cornell.

Mayfield's selection of ornithology as an avocation was a thoughtful choice. He had continued in basketball and tennis for some years after college, but recognized that with the passing years these would be less rewarding, and further, that they did not fit well with the extensive traveling he did for his company. Birds, a minor interest since childhood, could be studied anywhere in the world. He recalls identifying his first bird, a rose-breasted grosbeak, at the age of six by borrowing a neighbor's bird book. As a high school freshman he persuaded his father to buy a pair of binoculars from a pawnshop.

Courtesy of Harold Mayfield

1990 Allen Award winner Harold Mayfield scrupulously records observations on Bathurst Island, Canada. The epitome of the amateur, he is a type specimen, the individual that determines the basis for the characteristics of a species.

He studied birds with the intensity that characterized all of his activities. In 1942 he published the first records for his area of rare birds such as the least tern and the boreal chickadee, and first nestings near Toledo of the purple finch and blue grosbeak.

Mayfield soon met Dr. Josselyn Van Tyne, curator of birds at the University of Michigan's Museum of Zoology. Van Tyne invited Mayfield to join him in field studies of the rare Kirtland's warbler, a species which nests only in the pine barrens of Michigan's lower peninsula. For 17 years thereafter, Mayfield and his family spent their three-week vacations at Higgins Lake in warbler country. After a few years, the children sometimes asked, "Daddy, can't we ever take a vacation anywhere else?"

After Van Tyne died in 1957, Mayfield continued alone, and in 1960 published the definitive work on the species. The next year the book earned him the highest honor in American ornithology, the Brewster Medal. This book and Mayfield's 36 other publications on the species have been of key importance to the bird's survival.

Besides his Kirtland's warbler studies, Mayfield made improvements in quantitative methods. He applied his talents to the issue of calculating nesting success. The problem was that in field studies of nesting birds, researchers found few nests at the beginning of nest-building or even of egg-laying, and seldom followed the incubation process continuously until the young were fledged. But instead of acknowledging that egg losses could have occurred before the nest was discovered, they usually assumed that the clutches they recorded were all the eggs laid. Thus, reports were higher than the actual nesting success, sometimes by 50 percent.

Mayfield produced an elegant method to achieve greater accuracy, and to make it possible to use observations that covered only portions of the total nesting period. Noting that records are meaningful only if the time between observations is reported, he proposed the "nest day" as the unit of exposure to risk of failure or mortality. This permitted observers to extrapolate the results they observed to cover the entire nesting period, and to calculate nest mortality and nest survival separately for each of the stages from nest-building to fledging. Mayfield's paper proposing the new method was one of the most widely quoted ever to appear in the *Wilson Bulletin*. The method has since been used in hundreds of studies throughout the world, including the nest record program.

Other quantitative studies were his analysis of problems in estimating population size by counting singing males, and his work on the chance distribution of cowbird eggs. Prevailing opinions on both of these topics had varied widely; Mayfield produced convincing conclusions. He also studied the rare red phalarope for three seasons in the Canadian Arctic and produced comprehensive publications on the species.

When traveling to less exotic locations, Mayfield sometimes combined ornithology with business trips, adding to company travel weekends or holidays of bird study. In a recent letter he wrote, "Owens-Illinois, Inc., had plants from coast to coast, and eventually I visited all of them, some many times. We had three plants in southern New Jersey and these gave me opportunities to visit Atlantic City, Cape May, and Delaware Bay, all prime birding areas. One high spot was my finding the rare Swainson's warbler in nesting season within sight of the factory near Charleston, West Virginia. I found that every state had its own attractions." Company activities in the Bahamas made possible Mayfield's five searches for the wintering grounds of the Kirtland's warbler. In Mexico and Nicaragua he participated in studies of the behavior of tropical jays.

A telegram of congratulations arrived for Mayfield. He wondered who belonged to the simple signature, "Philip." Then he noticed the address: Buckingham Palace

Mayfield's tact, evenhandedness, and commitment to scientific values are illustrated in an article he wrote that attracted much attention, "Jack Miner and the Role of Predators in Nature." Miner had become known throughout the continent for his private sanctuary for Canada geese in his home town of Kingsville, Ontario, for the scripture-bearing bands he placed on the geese to carry religion to Native Americans, and for his homespun decrees on conservation. An eloquent speaker, he preached his views throughout Canada and the United States. Unfortunately his untutored perspective stressed destroying all predators to save the "good" animals. Miner's irrational excesses, particularly those dealing with predators, were exasperating to people who based their views of conservation on science and reason.

When a group of Toledo naturalists visited the Jack Miner Refuge, one visitor was disturbed enough to write a sharply critical account that the editor of the group's *Yearbook* felt uncomfortable publishing. He asked Mayfield to write a new version. Mayfield visited the refuge and reviewed its literature. In a brief article he recognized Miner's contributions, but effectively countered the conservation rhetoric. The article was praised by conservationists and widely reprinted, contributing to the subsequent decline in Miner's influence.

Mayfield enjoys birds so deeply that he was willing to suffer a substantial financial penalty by taking early retirement in 1971 to devote more time to his research. He is not a bird lister; his heart is in learning about birds, studying them in depth at close range, and sharing his findings with others. At home he attracts birds by providing food, water, nesting sites, and shelter, and he takes beautiful photographs of them. His paper on counts of singing males was supported by 10 censuses on his home acreage near Toledo. A happy family life has probably contributed to Mayfield's successes; he celebrated his 50th wedding anniversary in 1986. Unfortunately that same year an auto accident left Mayfield too handicapped for the vigorous field work he enjoyed for so many years, but he is still researching and writing.

Few ornithologists have received more honors and awards. Only Mayfield has been president of the American Ornithologists' Union, the Wilson Ornithological Society, and the Cooper Ornithological Society. He has received honorary doctorates from Bowling Green State University and Occidental College; each of them recognized his contributions in both biology and business. He was selected a Fellow of the American Association for the Advancement of Science and named to the Ohio Conservation Hall of Fame. Among several awards for his Kirtland's warbler work were the Conservation Award of the Detroit Audubon Society and the 75th Anniversary Award of the U.S. Forest Service for his research on the species in the Huron National Forest.

Mayfield, and his family too, have accepted such honors without fanfare. Typical was the reaction of a daughter, then 17 years old, who looked up from her reading when the Detroit award arrived to ask, "What is it this time?" When told, she said, "Big deal" and returned to her reading. Only one of the notices caused a stir, a Western Union message congratulating Mayfield on his success in establishing reserves for the Kirtland's warbler. It was signed simply "Philip." After wondering which of the Philips he knew might send such a message, he noted the address: Buckingham Palace.

Ornithology is a science to which amateurs can contribute, and Harold Mayfield epitomizes the amateur role; ornithologist Harrison Tordoff has called him "the type specimen." His combination of research, authorship, and leadership is unique. Amateur he may be, but his accomplishments are of the highest level of professionalism. □

Gus Swanson worked at Cornell for 18 years—as professor and head of the Department of Conservation, and as executive director and chairman of the board of the Lab of Ornithology. He has taught at several other universities and served in Washington as chief of the Division of Wildlife Research of the U.S. Fish and Wildlife Service.

Further Reading

Mayfield, Harold. *The Kirtland's Warbler.* Bloomfield Hills, Michigan: Cranbrook Institute of Science, 1960.

CONFESSION OF AN EX-10xER

Jack Connor

The moment I realized I had come all the way back to 7x was on November 4 last year during a family drive around the Brigantine dikes. My wife, Jesse, spotted a hooded merganser out her window, the first for the fall, and I stepped on the brakes, reached for my Bushnell 7x35s, and handed my son in the backseat my Zeiss 10x40s. Yes, that's right, I handed him the *Zeisses!*—the same 10xs I used to keep on the top of the bookshelf so even my wife couldn't reach them.

I had bought those Zeisses five years earlier, after psyching up for the expenditure for months. They arrived by special delivery in a white box and a soft leather case so elegant I folded it back in the box to protect it from scratches and left it there ever after. The bins smelled—of fresh rubber, polished glass, and credit cards. Holding them delicately in both hands, my heart beating as hard as it had the first time I ever danced with a girl, I minced down the front steps, stopped at the gate, and lifted them to my eyes. Wow! I could read the license plate on a car two blocks away. A crow landed on the baseball field across the street. I aimed, twirled the focus ring, and looked. The crow's eyes were as big as marbles; his feathers glowed a black light.

Just to make myself feel even better, I went back inside and brought out my 7xs—trusty, thumb-focus Bushnell Discoverers that had served me well for a decade. I looked at the crow and laughed. It was only a crow.

ANTHONY TABER

I abandoned the 7xs without another thought. They got put in the kitchen pantry in case someone might want to look at a bird at the backyard feeder. I wouldn't use them myself, of course. If an unusual bird landed on one of our feeders, I ran out to the living room, stood on tiptoe to reach for the 10xs on the bookshelf, and ran back to the kitchen.

10x bins are addicting—and macho. On a typical field trip the owner of a pair of 10xs should be able to identify two or three birds beyond the range of birders with 7x or 8x; a buteo riding a thermal into the stratosphere, a kittiwake on the horizon, a warbler at the top of a 200-foot fir. And let's be honest here, there are few pleasures in life as gratifying as showing up other birders on field trips. A tiny bird lands at the top of the tree, the whole gang lifts their bins to look, and only you can announce, "It's a female blackpoll, everybody." Those are the kind of moments 10x owners love best—just as Corvette owners love best how fast their car accelerates on interstate highways. Every 10x owner knows 7x bins give you a wider field of view, just as every Corvette owner knows four-cylinder engines give you better gas mileage. But hey! Who cares? Wider fields of view and better MPG may be practical but they are definitely not macho.

This is why all of us 10x owners puffed up our chests and snorted when in 1987 Bausch & Lomb first released its new top-of-the-line Elite in 8x only, and when the Elite and the previously seldom-seen Zeiss 7x42s started appearing at birding hot spots everywhere. The Zeiss 7xs were selling for about a hundred dollars less than the Zeiss 10xs, so I dismissed the new owners as misguided scrimpers. "Imagine all the good birds they're letting get by them," I said to a couple of fellow 10xers, "just to save a hundred bucks."

Then one day I encountered Jimmy Dowdell at Brigantine with a pair of Zeiss 7xs around his neck. Dowdell had been a loyal 10xer for years, and he has his choice of any bins he wants, since he is co-owner of For The Birds, the birding accessories store in Cape May. He is also a ferociously intense birder. Trying to imagine Dowdell choosing a pair of bins that would allow good birds to get by him was like trying to imagine Michael Jordan strapping on snowshoes so the Boston Celtics could block his dunk shots. Before I could ask him for an explanation for the defection, however, a sparrow cheeped from somewhere in the marsh behind us, and Dowdell disappeared into the phragmites in pursuit.

A week or two later, I met Pennsylvania birder and photographer Bobby Mitchell wearing Zeiss 7xs at the seawatch in Avalon, New Jersey. Mitchell doesn't own a birding store, so he had taken a loss trading in his year-old 10x40s for his new 7xs. "You can scan so much faster," he said. "And you see so many more birds." Mitchell is a quiet, unassuming type, not the kind of guy I enjoy putting down, so instead of pointing out, "You must mean more of the close birds nobody cares about," I bit my tongue. Which was a good thing because right about then he spotted a jaeger on the horizon and then patiently led me across the field of view—"It's left of the puffy cloud . . . now there are two herring gulls just below it . . . it's coming up on that red buoy . . . now it's over the buoy . . . "—until at last I found it in my 10xs.

One more blow to my 10x faith came later that fall, when *The Living Bird Quarterly* published the results of its 1988 survey of binoculars. The Zeiss 7xs finished at the top of the chart, just ahead of two 8x bins, the Nikon Eagle and the Bausch & Lomb Elite. My Zeiss 10x40s (which had finished first in the original *TLBQ* test in 1985) limped in fifth!

One weekend that winter, heading out the door on a bicycle trip around the farmlands near our house, I pulled my old Bushnells out of the pantry. In the middle of the February doldrums there wasn't much chance I'd miss any rarities, so I figured, "What the heck, let's experiment. How much do you lose with 7x?"

No, it was not an instant, born-again reconversion. In fact, my first few looks through 7x made me want to pedal back to the house for the 10xs. One immediate complication was that my Bushnells don't compare in optical quality with my Zeisses—how could they? They were a third as expensive and are 10 years older. Another complication was that my years of 10xing had changed my subconscious expectations about size and distance. At 7x, herring gulls looked like ring-bills; hermit thrushes looked like ovenbirds.

Still, I found myself choosing the 7xs more and more frequently over the next few months, and slowly the paradoxical truth sunk in: *birding is easier with lower-powered bins*. 10xers contemplating 7x birding imagine there's a lot of squinting involved—as you work hard to spot the eyeline in an accipiter 200 yards up or try to judge the bill color of a goldeneye a quarter-mile offshore. What the typical 10xer forgets is how few birds (and even fewer field marks) you encounter each day that are just far enough away to be unidentifiable at 7x, but not so far away that you need your 20x spotting scope to see them. 10xers also tend to overlook how much speed is gained with 7x. A warbler lands in the tree above your head, hops once as you raise your bins, and it's still there in a 7x field of view as you focus. Meanwhile, the 10xer next to you is scanning wildly, lost in birdless branches.

There is also a subtle, probably not measurable advantage to 7xs in the same open situations where 10xs work best—something that might be called the "vista effect." Looking through 7x bins, you see more of the panoramas in the world of birds. A kettle of a hundred broadwings comes circling overhead or a flock of a thousand snow geese comes honking by, and the flight is more spectacular at 7x, the sense of movement more satisfying. Less is closed out.

10x bins certainly have their advantages and their moments. Birders who prefer 7x views but can't stand to think they will miss some birds might consider putting their spotting scopes on shoulder stocks (you will definitely need your scope more often when using 7x bins). Maybe soon, birders will routinely carry a couple of different pairs of bins, like photographers carrying multiple lenses, and switch around in different situations.

What I do is let my son use the 10xs. That way when he starts shouting from the backseat, "Dad, Dad, isn't this an *eagle* out beyond the ducks?" I just reach around and rip them out of his hands. ☐

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A VERY SPECIAL SPECIES

Pete Dunne

I've got a hobby. No, not birding. That's an obsession. My hobby is collecting the dumb ads that attempt to target the birding market and manage only to shoot themselves in the foot.

You probably think companies that spend big bucks developing binoculars for the multimillion-dollar birding market would understand birders.

Go ahead. Dip into the couchside pile. Pick any birding magazine. Leaf through the pages. See what I mean?

A few ads are on target. They say what birders want to hear and they say it in a language birders understand. "Is it common or Forster's?" Bausch & Lomb demands. The photo is textbook birder quiz material, the question accurate down to the sense of urgency. Is it any coincidence that Bausch & Lomb has a birding advisory council?

Some ads are just innocuous. Mirador: "The Next Generation." Hmmmmm. A lesson in Mendelian principles, perhaps? An appeal to old "Star Trek" buffs who have lived long and prospered?

Others plain miss the market — like the bino manufacturer whose ad depicts a three-photo collage of a moose, an outfielder committing suicide against the backfield wall, and a curvaceous female. The tagline reads: "No matter what your game is."

Have moose been reclassified or something? The hoofed heron? The great northern wader? And how many birds *does* Willy Mays have on his left field list?

The game, fellas, is birding.

But the ones I love, the ads that send me to the floor, are those that show us how savvy they are . . . and don't.

One ad's opening boast is "Rare Bird." The rare bird is a pair of binoculars loafing on a clipped suburban lawn. Boy, that says birding, doesn't it? The ad starts off, "Nikon is a very special species of binocular."

Nikon? A "species?" It might be a genus (if binocular models lie at the species level), but Nikon makes cameras, too, a whole different family. That makes Nikon at least an order, doesn't it?

Does this mean that Nikon makes a bum line of optics? No, Nikon makes a couple of exceptional birding binoculars. It's just that birders won't learn this from Nikon's ad, which is the point of advertising, right?

Then there is Leica: "Best in the Field." First, give points for honesty. Most models of Leica are best used "in the field" since they don't focus close enough to serve in tight woodland quarters. With an 8x glass that focuses only to 16 feet, and a 10x glass that stops at 28 feet, close focus is not one of Leica's trumps.

The opening line is precious. "After scouting for days, you finally see her!"

Scout? Birders scout? What is this, the Natty Bumpo school of birding? Birders *search* for birds, *look* for birds, *scan*, *scope*, and even *bird* for birds (although Webster's Dictionary disputes this). And *days*? That's ridiculous. Try hours. Minutes.

STEVE CARVER

The way real birders do it is to drive up to the place where all the people are standing. Put their binoculars on the spot where the scopes are trained. Smile. Get back into their rental. Drive away.

The ad that owns clear title to marketing's cellar is the Tasco ad featuring the killer-clean-cut Yuppie couple. As one female birder observed, "If I'd known that guys who look like that are out birding, I'd have taken up this hobby years ago."

But ignore the Robert Redford clone and all the junk dangling from his neck. Real birders don't use zoom binoculars. Overlook the thirtysomething hairdo and the Laura Ashley-style look of the pith helmet. Peterson, Pough, and Robbins be praised, the guy is wearing a genuine *pith helmet*. I thought this image went out with opera glasses and whale-oil lamps. And is it my imagination, or is that a Chester Reed field guide in her hand? Where did they ever *find* one? The setup is so contrived you may fail to note that Tasco offers a "colorful line of optics," and even carries the NFL endorsement.

I don't know how many birds Joe Montana has on his backfield list, and I doubt that Willy Mays's left field list is any better. But I am willing to bet that most birders don't particularly know and don't particularly care — a point that people who try to market to birders may want to consider. □

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Quarterly

Autumn 1990

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Quarterly

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Cover: Taxonomists classify the limpkin between cranes and rails, and the awkward bird looks like it has been constructed from their spare parts. Slowly it wades through swamps and along streams in the Everglades and points south, feeding on frogs, lizards, worms, and in particular snails, which the bird deftly extracts from the shell after wedging the mollusc between two tree roots. Our cover bird is about to enjoy a freshwater clam in Juniper Springs, Florida.
Back cover: A reddish egret seems to dance across the water in Galveston Bay, Texas. Called the most energetic of the herons by some observers, it flits and darts as it feeds, sometimes making short, hopping flights. Photographs by Tim Fitzharris.
Right: That worm looks tasty, but is it pesticide free? A landmark study linking DDT to bird deaths had its start on a suburban lawn. Photograph by Wendell Smith.

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Exactly what puts the "good" in "good bird?"

p. 6 Noxious lunch

Common eider by N. G. Blake (Bruce Coleman Limited)

Tags Are a Drag

Wing tags are an essential tool for scientists studying the behavior of water birds; ordinary leg bands aren't very useful when studying a species that spends much of its time with its ankles submerged. Unfortunately the colorful thin plastic tags may interfere indirectly with egg laying in the birds that wear them. Norwegian zoologists Jan Bustnes and Kjell Erikstad recently reported that wing-tagged common eiders lay smaller-than-normal eggs (*Journal of Wildlife Management* 54(2); 1990). The marked birds also begin laying their eggs an average of six days later than most untagged females.

Like a bear preparing for hibernation, an eider female accumulates a layer of fat before the breeding season. She eats very little while laying and incubating her eggs, drawing on her fat reserves. Other studies have demonstrated that birds wearing tags don't gain as much weight as untagged ones. Without sufficient reserves a female apparently can't produce normal-sized eggs.

The researchers suggest that tags may interfere with prebreeding feeding in several ways. They cite other studies in which wing-tagged birds have been observed preening their tags repeatedly, an activity that takes up time more profitably spent diving for mollusks and crustaceans. And when a tagged duck dives, it may burn more energy dragging the tag through the water, just as a car burns more gas dragging a U-Haul down the freeway.

The ornithological literature previously had documented other adverse effects from wing tags, including skin and feather abrasions. Bustnes and Erikstad recommend that researchers using wing tags be aware that these helpful tools can have adverse effects on their subjects' reproductive performance.

Too Close for Comfort

The U.S. Army Corps of Engineers plans to issue a permit for a high-pressure oil well on the Texas coast near Aransas National Wildlife Refuge, less than a mile from the winter home of most of the world's whooping cranes.

The Corps has refused to consult with the U.S. Fish and Wildlife Service under the provisions of the Endangered Species Act, saying the drilling poses "no great risk." Claiming that a permit would violate both the Endangered Species and Clean Water Acts, the National Audubon Society has notified the Corps of its intention to take the agency to court.

It's ironic that the cranes face a new threat just when the status of this endangered species seems to be improving. Whooping crane populations nearly doubled in the past decade; researchers counted 213 of the majestic white birds worldwide in 1989, up from 119 birds in 1980 and 15 in 1941. This recovery is unprecedented in the history of endangered species conservation. Some scientists have speculated that the huge bird could be removed from the endangered species list by the year 2020—assuming no oil spills.

Wild Blue Yonder

New Hampshire's largest remaining stretch of undeveloped estuarine shoreline, a part of Pease Air Force Base, may become a national wildlife refuge. For over 30 years the Air Force has managed 1,200 acres of shoreline, wetlands, and uplands as if it were a refuge already. Located on the Great Bay estuary, the marshy expanse supports a wide variety of vegetation that provides nesting or migratory habitat for many shorebirds and waterfowl.

The refuge will become a reality only if financial details can be worked out. The base is being shut down, and provisions of the Base Closure and Realignment Public Act of 1988 say that the Air Force must receive "fair market value" for the land. The U.S. Fish and Wildlife Service, which administers the national wildlife refuge system, has expressed enthusiasm for the proposed refuge but cannot pay fair market value.

USFWS will be able to acquire the refuge if President George Bush and Secretary of Defense Richard Cheney agree to mandate an interagency transfer of the property at no cost to the service. Located about two hours north of Boston, the refuge would be a desirable destination for a large population of birders. A coalition of local, state, and national conservation organizations has launched an appeal for wide public support of the refuge.

Invasion of the Seed Snatchers

Hordes of invading pine siskins and astronomical numbers of house sparrows crowded North America's bird feeders last winter, according to Project FeederWatch. The continent-wide survey of birds at backyard feeders is a joint project of the Lab and Long Point Bird Observatory, Port Rowan, Ontario.

For the second time since the survey was launched in 1987, FeederWatch has documented a winter invasion of boreal birds. Pine siskins, common redpolls, red-breasted nuthatches, and pine grosbeaks usually winter in Canada and the northern United States, but venture southward when the alder and conifer seeds they relish are in short supply.

Other bird surveys such as Christmas Bird Counts can document this type of invasion but provide only a "snapshot" of the phenomenon because counts cover a single three-week period. FeederWatch provides a unique perspective on the timing and volume of the invasion because participants make observations at biweekly intervals from November to March.

Nonboreal species were also more abundant in the winter of 1989–90 than they had been in previous years. American goldfinches, northern cardinals, tufted titmice, and many species of woodpeckers and jays showed noteworthy increases in some regions. The cheering news that more birds came to feeders last winter contrasts with reports of declines in neotropical migrants and ducks.

Keep on Feeding

I am writing in regard to the article by Margaret C. Brittingham ("Should We Feed Birds in Winter?" Winter 1990). I have read of her research in other magazines and have also heard birders claim it's now been proven one does not have to feed the birds conscientiously all winter.

Brittingham's study was done in "remote areas where no bird feeders were present." I would expect birds in a habitat not much altered by humans to be able to survive on a natural diet; birds live only where all the conditions for their survival are met.

Most bird feeding is actually done in areas very much altered by humans—habitat covered by asphalt or concrete or by large expanses of lawn—where not much natural food is available for birds during the winter and early spring. I find it unjustified for anyone to suggest (especially based on Brittingham's study) that urban and suburban birds will do just fine if one suddenly decides to stop feeding them.

A study should be done in suburbia in which feeders are left empty after they have been kept filled for several months. I do not know if this study would be possible. But lacking such a study, it is prudent to assume that human encroachment has made survival quite a challenge for birds and, therefore, feeding them probably has a substantial impact on survival rates.

Some people think it's O.K. to stop feeding because birds cover large areas every day in search of food; if there's another feeder in the neighborhood the birds will find it. It's not obvious to me that birds truly do all of this traveling. My neighbor who feeds birds lives about a quarter of a mile away as the crow flies. Last winter he played host to many evening grosbeaks and a white-headed dark-eyed junco. I never saw that distinctive junco in my yard, and only on a couple of occasions did evening grosbeaks appear here. Yet my neighbor and I put out the same types of seeds in the same types of feeders.

People should act responsibly and not expect the birds suddenly to find a new source of food in the dead of winter once they've become accustomed to a site.

Marlene Condon
Crozet, Virginia

The author's response:

Marlene Condon raises important questions and concerns about bird feeding that were not adequately covered in my article.

The birds that visit suburban and urban bird feeders during winter can be sorted into three groups based on their behavior and food preferences. The first group includes the gregarious seed eaters: pine siskins, juncos, goldfinches, and evening grosbeaks. These species are strong fliers and form large flocks. They roam over large areas until they find a concentrated source of seeds (a feeder or a group of conifers), eat the seeds, and move to a new location. Species in this group probably aren't harmed when feeders are empty.

The second group includes native species that are found in pairs or small flocks and that generally do not roam far from their winter home range: chickadees, titmice, woodpeckers, nuthatches, and blue jays. These species are most abundant in older suburban areas with mature trees and native vegetation, and are less abundant in urban areas or newer suburban areas covered primarily by lawns. This suggests to me that these species still depend primarily on natural food supplies.

How these species respond when a feeder in their home range is left empty is an interesting question and one we will be looking at next winter. In a study conducted in 1932 near Ithaca, New York, a researcher banded 14 chickadees at his feeder and then stopped feeding in midwinter. Eleven of the 14 chickadees were subsequently observed at a feeder over one quarter of a mile away, suggesting that they can shift their primary feeding sites rapidly.

The third group of suburban and urban feeder users includes non-native species that coexist well with people, such as house sparrows and starlings. These birds are most common at feeders in urban areas where little native vegetation remains. They depend heavily on food provided by people, including the seeds at bird feeders, garbage, and the trash around fast-food restaurants. These species would probably be less able to survive the winter if urban feeders were left empty.

Margaret Clark Brittingham
State College, Pennsylvania

Birding the Chinese Palace

After I read "Bitterness & Sweetness of Niao Mis in China" (Winter 1990), I took the magazine to the office where I used to work and made an enlarged copy of the Chinese symbols on page 29.

I taped the symbols inside the rear window on my van, wondering how long it would be before some Chinese person commented on them. I didn't have long to wait. Last week I parked at the local Chinese Palace, went inside, and placed my order. About five minutes later I heard some giggling back in the kitchen. A Chinese waitress came into the dining room with a big grin on her face, looked around, and went back to the kitchen. More giggling.

In a few minutes she brought me my rice and shrimp, still obviously tickled about something. Was it the sign on my van window? She laughed and said "Is that yours? I was thinking maybe it was some of our friends." I asked for a translation of the symbols and she immediately replied, "Audubon." Then I had a good laugh, too. I guess she figured all birders were from Audubon. She asked where I had gotten the sign and I told her about the article about birding in China, and what the article said the symbols were supposed to mean, and she agreed that it was correct—bird watchers, or people interested in birds.

I am going to leave the sign on the window and see what happens next.

Ralph A. Fisher
Silver City, New Mexico

Glad to Help

We have received a $100 donation from someone who read your article about the South Texas Wildlife Corridor ("On the Front," Spring 1990). We also have had several letters from other *TLBQ* readers asking how they can help us complete the corridor.

Thank you for writing such an excellent piece about our dilemma in obtaining land for the wildlife corridor. We hope this type of publicity and response will continue until the corridor is complete.

Janice L. Shafer
Weslaco, Texas

We welcome letters from readers. Write to:

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Letters may be edited for length or clarity.

THOMAS D. MANGELSEN

DEAD BIRDS DON'T FLY

Ted Levin

The whistle hit a single note, loud and long, and sent it straight up like an arrow. Thirty-four bands of dyed porcupine quills, flattened and woven in tight alternating triangles, colored the whistle's stem red and yellow. Two eagle plumes hung from one end. Strips of sinew bound the quills to the bone, and soft, white pronghorn leather bound the feathers and looped around the mouthpiece so the musician could hang the whistle from his neck.

Made of bone cut from the wing of a fallen eagle, the whistle had been played by Plains Indians to call upon the wind and the sun, upon the buffalo and the elk, upon their grandfather the Great Spirit to guide them down the good road.

Since the eagle flies high, he sees the Earth curve toward the horizon, sees everything as one. According to Sioux tradition the eagle's voice lives within the bone whistle, and the Great Spirit's voice lives there too, for they are one.

A medicine man made the bone whistle from the large wing bone of a bald or golden eagle — the humerus — the bone which anchors the tendons and flight muscles from the sternum. Since the bone is hollow, converting it into a whistle was easy. The piercing, primordial sound compels attention. The whistle was stored at Dartmouth College pending identification and a catalogue number. The assistant curator of anthropology there needed a hand in identifying the feathers that decorated the whistle, so I stopped by to help.

I fingered the bone whistle. After a few moments I gave it a cautious toot. I did it again, softly so as not to arouse the spirits or disturb the curator. Two more toots. Silence. And then, with abandon, I blew out a century of dust from inside the bone. My thoughts drift with the shrill sound until I see an eagle.

I see it high above the Wilder Dam, a steel noose which garrotes the Connecticut River several miles south of Hanover, New Hampshire. With wings flat and primary flight feathers extended, he circles the edge of a thermal, head and tail white, body and wings brown. Around and around with eyes that resolve the whole Upper Valley. From his sky perch he looks south down the Connecticut to where the White River, the Mascoma, and the Ottauquechee empty their freight, to the white and restless water at Sumner's Falls. Upriver he sees Mink Brook, Blood Brook, and the Ompompanoosuc, and the snow-capped summit of Mount Moosilauke. He sees the lines of hills like rippling water that gently roll away from the Connecticut toward the mountains, green and white.

The eagle sees everything: the subdivided farms, the Miracle Mile, the condos, the factory outlets. He sees the ribbons of asphalt that stretch like dark snakes from Connecticut and Massachusetts, and the ski traffic. He sees the accelerated development, the upheaval, and the maddening effort to salvage what is left of the wild land.

I blow louder and longer upon the bone whistle.

Wilder Dam will never be the same. I no longer think of the open water below the dam, black against the ice, as just another riverine attraction for wintering ducks, or as just another source of winter mist. The arrival of the eagle changed that. I first saw the big bird in December 1981, perched in a gaunt cottonwood along the Connecticut just below the juncture of the Ottauquechee. Backlit by the afternoon sun he sat in the company of several hundred crows. The crows pass winter by mining undigested corn from manure mounds along the River Road, and in April they spread through the valley to breed. But the eagle, a rambler from parts unknown, an immature bird that found the river to his liking, stayed for a few days and then disappeared as mysteriously as he had arrived.

The following January an eagle appeared in the riverside elms in North Hartland and fished Sumner's Falls a mile or so downriver. After hanging out for a week with the crows he flew north six miles to Wilder Dam. He stayed until ice-out. Since then an eagle has returned to the dam every winter for ten consecutive years. I cannot be sure whether each winter I watched the same eagle set up housekeeping below the dam, diving for suckers and walleyes and mergansers, or whether each year the roost trees and open water lure a new bird that hunts alone in the midst of a rapidly developing valley. I can guess, though, for bald eagles have progressive molts.

In 1981 the immature bird in North Hartland was dark with some flecks of white or buff below. Over the next four years he gradually achieved his distinctive adult plumage. On January 20, 1985, an adult bald eagle arrived at Wilder Dam, left after seven weeks, and returned the following December. He was gone by March ice-out and has returned every December since. When the river unlocks, he leaves.

I blast on the bone whistle, rocking and drifting with sound. My eagle drifts through local history; his feathers are threads that stitch the present to the past.

By the late 1940s wintering eagles had disappeared from this stretch of the Connecticut River. During the 1950s evidence built up against DDT. In the upper Midwest researchers were convinced that the pesticide was the problem. Their data from Michigan, Wisconsin, and Minnesota confirmed it, for dead and dying birds—robins, marsh hawks, eagles—had large concentrations of DDT in their fat and brains.

But where was the evidence from the Northeast? Beginning in 1960 Betty Sherrard, an energetic naturalist, fretted over the robins which convulsed and died each spring on Hanover lawns. She had just finished reading *Silent Spring* and suspected DDT was to blame; every April the town sprayed their beloved elms to control the spread of Dutch elm disease. When a myrtle warbler died in her hands less than an hour after her neighborhood had been drenched with DDT, she asked two Dartmouth biochemists, Drs. Charles and Doris Wurster, to investigate.

They agreed to help. For several days in April 1963, approximately 1,300 pounds of DDT—about a half pound per tree—were sprayed on more than two thousand Hanover elms. Just across the river, Norwich, then not nearly as affluent as Hanover, could not afford to treat its elms. The Wursters thus had a perfect setup for a scientific experiment: a control population of birds, one almost free of DDT, that could be compared to the contaminated Hanover population.

The Wursters and two friends surveyed a 15-acre section of Hanover and an ecologically similar section of Norwich. They counted robins on their way to work, and at lunch, and traded routes daily from April 8 to mid-May to avoid biased results. After mid-May the counts were spaced at intervals of two and three days until mid-June. The results were so striking that the study became a seminal piece of work to birders, and a primary thread in the development of the Environmental Defense Fund.

Nothing happened the morning after spraying the elms. The DDT took weeks to travel from the elms into the soil and into the earthworms. By mid-May dead robins began to appear in Hanover. Although Norwich had a few dead robins none had ingested lethal dosages of DDT. All the Hanover casualties were contaminated with fatal levels of the pesticide. And the carnage did not stop with robins. Swift and lethal, the chemical reached not only earthworms but also bark and aerial insects. Insect eaters, chipping sparrows, yellow-rumped warblers, tree swallows, white- and red-breasted nuthatches, yellow-shafted flickers, yellow-bellied sapsuckers, downy and hairy woodpeckers, were also poisoned.

The eagle flies high and sees everything as one.

Hanover lost more than 70 percent of its breeding robins in 1963, and Norwich, relatively free from the effects of the pesticide, actually gained a few birds from nearby floating populations.

Not everyone was convinced by the results of the study. One California scientist claimed that the robins had simply flown across the river, thereby explaining the population decline in Hanover and the slight rise in Norwich. But dead birds don't fly. Fortunately, the ground crew at Dartmouth College heeded the Wursters' warning and switched to a nontoxic pesticide, methoxychlor, in 1964. Although a few robins died that spring, the result of residual DDT, the population rebounded and there was no evidence of the poison in other bird species.

The Wursters divorced. Doris stayed in Hanover and Charles left for the State University of New York at Stony Brook, Long Island, where he continued what he had started and became recognized as a world authority on the toxic effects of DDT. Through his efforts Suffolk County, Long Island, became the first municipality to ban the pesticide. With a few colleagues he formed the Environmental Defense Fund which successfully lobbied Congress to ban DDT in the United States in 1972. It had all started in Hanover with a casual study on the way to work. For this the Wilder Dam eagle should be thankful, for his river, although choking on development today, is once again free of DDT.

The cry of the bone whistle returns the eagle's image to me.

He is alone, feeding on fish trapped in the shallows. When he is through eating he flies to a red oak on the Vermont side of the dam, then to a white pine on the New Hampshire side. The valley is his. He roosts in a wind-sheltered pine on the ledges above Interstate 91. He patrols hundreds of square miles from Lyme south to Cornish, west up the White

River to take Atlantic salmon from the federal fish hatchery in Bethel, and east up the Mascoma. A Norwich farmer loses a pinioned Canada goose to the big bird, and in Lyme the eagle cleans up sheep guts. A controller at the Lebanon Airport spots him on radar. Shoppers watch him as he passes over a parking lot, commuters see him on their way to work. He is no stranger to the landfills and accepts charity at a White River bait shop.

I see him in the gray light of dawn just before Wilder Dam discharges water. He leaves a red oak and drops, talons extended, toward the shallow pools, dipping toward the water with wings extended and raised slightly above the horizontal. His tail angles down, shifting from side to side like a rudder, and his feet trail like landing gear. Casual passes, not those pushed by hunger, just broad lazy arcs down the oak, over the ducks, and across the river. The mergansers never flinch.

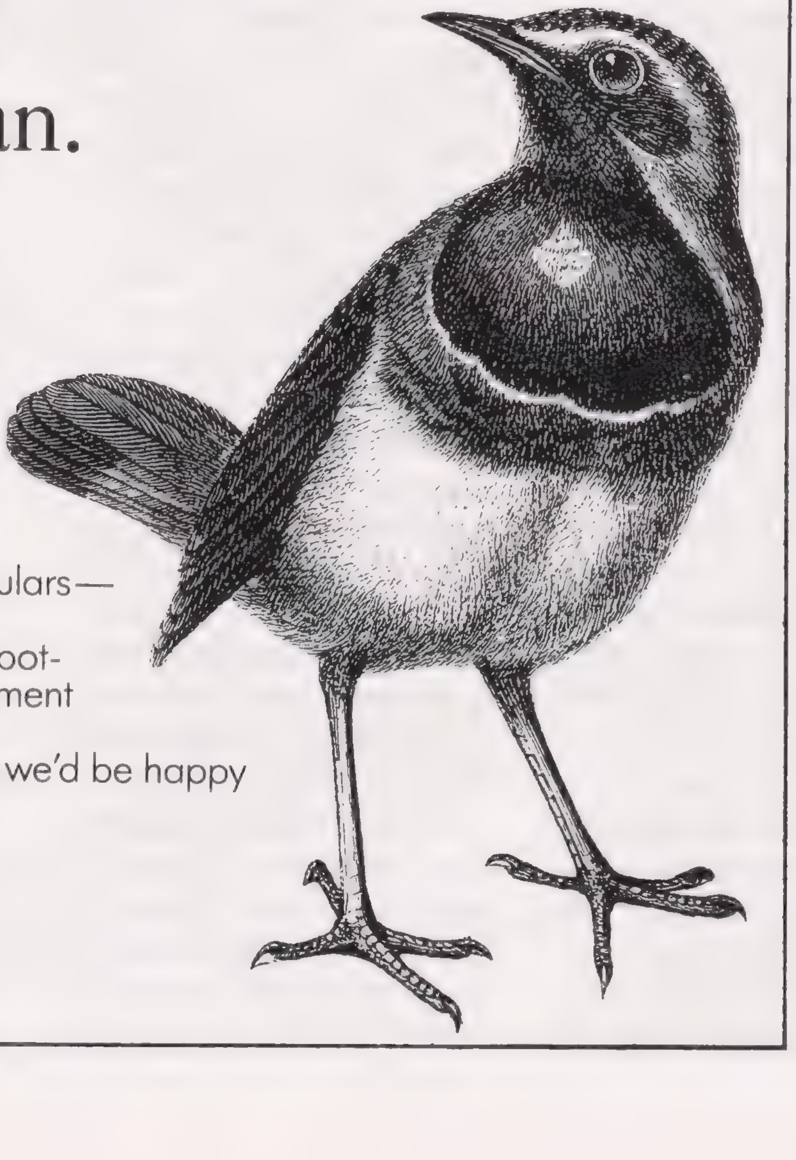
After the fourth pass the eagle flies to a silver maple on an island half a mile below the dam. While he's gone I walk down to the red oak and find the scales and bones of several suckers and a walleye. No sign of a duck carcass, but some electricians with the New England Power and Electric Company tell me that when Wilder Dam holds back water the eagle harasses the mergansers which bunch together and wait for the big bird to thin their ranks. Fish are the eagle's lodestone, however. He catches them himself, or steals from the ducks, or scavenges fisherman throwaways.

One winter I lobby the Vermont Fish and Wildlife Department for a deer carcass to lure the eagle into better view. I don't wait long. A warden brings a stiff-as-stone doe that had been bashed by a tractor-trailer. After staking the carcass into the snow several hundred yards below the dam, the warden wires on a note that reads, "Do Not Remove. This deer belongs to the State of Vermont."

The note has an immediate impact. A dam employee reports that a fisherman walked out to the carcass, looked it over, then shoved it downstream. The loss of the deer is the Upper Valley's, not the eagle's. I lose a chance to lure the bird into the open, to keep him on the ice morning after morning so that people can see the wild, resolute eyes, eyes that see the land as an integrated whole, a living watershed. Dozers and graders hide behind the hills.

The whistle hits its note and the eagle fades away. □

When writer and photographer Ted Levin is not watching the Wilder Dam eagle, he is at home in West Fairlee, Vermont. Naturalist for the Montshire Museum in Norwich, Vermont, he is author of *Backtracking: The Way of a Naturalist*. He writes regularly for *Yankee* and *Harrowsmith*, and is a contributor to *Audubon*.



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A QUIET EXIT

David Wilcove

I am not especially fond of game shows. They either make me feel ignorant or remind me of all the things I once learned and didn't know I had forgotten. So it's only fair that the riddle I pose here is a very simple one. What do the following birds have in common: dusky seaside sparrow, great auk, and ivory-billed woodpecker?

The answer, of course, is that they're all extinct (or nearly so, if a few ivorybills still survive in Cuba). But there's more to it than that. The disappearance of all three species is unquestionably a result of human activities. The dusky seaside sparrow lived in salt marshes in a tiny part of Florida. When the marshes were diked and burned, the sparrow vanished. The great auk was a big, flightless colonial seabird that nested on islands in the North Atlantic. It was easily (and relentlessly) hunted by sailors for its meat and feathers. And the ivorybill disappeared as the virgin bottomland forests of the southeast were logged during the 19th and early 20th centuries.

Indeed, the reasons for the demise of endangered or extinct birds are usually obvious: human actions are almost invariably the cause. When we convert natural habitats to cities, farms, and cattle pastures, we eliminate the birds that cannot survive in such strange, new worlds. Species with highly restricted ranges, such as the dusky seaside sparrow, are especially vulnerable to extinction, as are those with poor powers of escape, like the great auk.

How, then, do we explain the disappearance of the Appalachian Bewick's wren, an engaging little creature that actually thrived around people, often nesting in barns, sheds, and abandoned cars, a bird that was never hunted, trapped, or deliberately poisoned? Recent publications by scientists from the Maryland Natural Heritage Program provide a compelling if frustrating account of the strange case of the disappearing wren.

Bird watchers look in vain for the Appalachian Bewick's wren.

Approximately 18 races of the Bewick's wren occur in southwestern Canada, the United States, and Mexico. The Appalachian Bewick's wren is the easternmost race. It once bred throughout the unglaciated portions of Appalachia from Pennsylvania and southwestern Ontario south to Georgia and Alabama and west to Ohio, central Kentucky, and central Tennessee.

By most accounts the Appalachian Bewick's wren was a common resident of the southeastern mountains. In an 1885 manuscript the eminent ornithologist William Brewster described the wren as "one of the most abundant and conspicuous birds of the towns of western North Carolina. At Asheville it was breeding in such numbers that nearly every shed or other outbuilding harbored a pair." In Ohio, West Virginia, Maryland, Alabama, and Georgia, ornithologists described it as "common" or "abundant" during the latter half of the 19th century and beginning of the 20th. The wren was local but fairly common in parts of Tennessee, Virginia, and Pennsylvania, and an uncommon breeding species in the mountains and piedmont of South Carolina.

Its habitat preferences could hardly have been more accommodating of life in rural Appalachia. The little bird inhabited thickets, open woodlands and farmlands, and scrubby areas, often near streams. As Robert Ridgway, one of America's premier ornithologists, wrote in 1889:

> The Bewick's Wren does not need encouragement, for he comes of his own accord and installs himself as a member of the community wherever it suits his taste. He is found about the cowshed and barn; he investigates the pigsty; then explores the garden fence, and finally mounts to the roof and pours forth one of the sweetest songs that ever was heard.

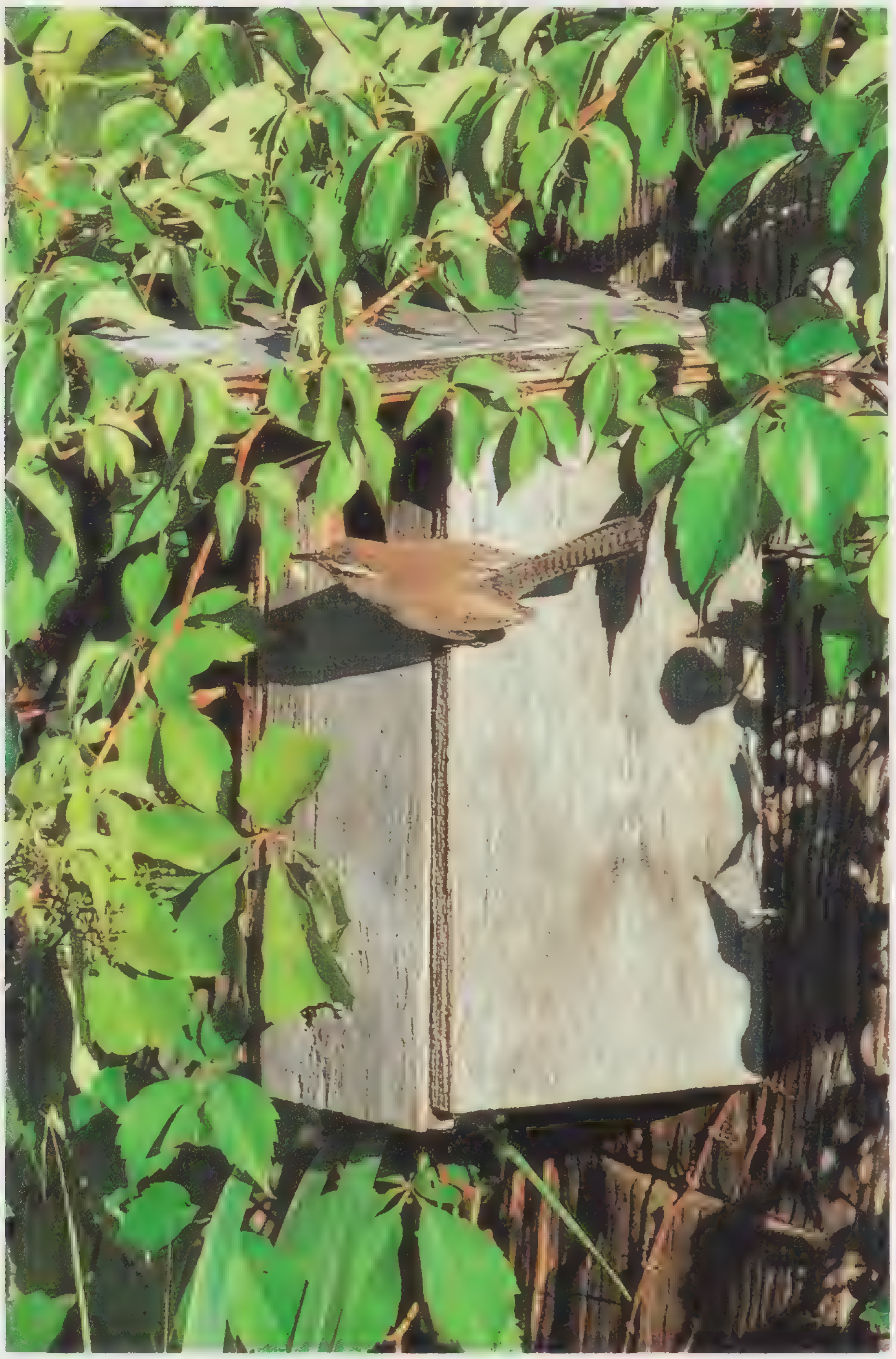
Then the Bewick's wren vanished. Breeding populations had crashed in Pennsylvania and North Carolina by the 1930s. In northeastern Tennessee the Appalachian Bewick's wren began to disappear around 1930, and by the late 1940s a local ornithologist declared it to be "one of the rarest of our birds." In Maryland, Virginia, and West Virginia the wren remained relatively common throughout the 30s, 40s, and into the 50s. But by the late 1970s it was a great rarity in all three states. In the past decade only 20 pairs have been noted in Maryland, Virginia, and West Virginia combined.

In 1986 Rodney Bartgis and Daniel Boone, scientists with the Maryland Natural Heritage program, requested that the U.S. Fish and Wildlife Service classify the Appalachian population of the Bewick's wren as endangered. The service agreed that listing was warranted, but declined to do so because it had a backlog of other species that were considered higher priorities for inclusion on the Endangered Species List.

The decision disappointed many conservationists but to be truthful, placing the Appalachian Bewick's wren on the list would probably do little to save it; there simply aren't enough wrens left to launch an effective conservation program. From time to time an individual bird or two is sighted, but there are no wren population centers to protect. And suitable habitat—thickets and farmlands —is apparently still plentiful.

The Bewick's wren is still common in much of the West, so the species itself is not in imminent danger of extinction; however, breeding bird surveys from 1965 through 1979 show significant declines in Bewick's wren populations as far west as Texas, prompting some ornithologists to worry that other races may eventually vanish. Thus, Bartgis and Boone's petition should serve as a warning to the USFWS about a growing problem with the species as a whole.

In the absence of data, theories abound to explain the



SCOTT SHALAWAY

Now silent in the Appalachian part of its range, Bewick's wren once rendered its sweet chip, chip, chip, de-da-a, te, dee *from almost any knothole, bird box, fence post, mail box, tin can, or basket.*

disappearance of the Appalachian Bewick's wren. The most common explanation is that it has been driven out by an expanding population of house wrens. The house wren is a fairly recent invader of unglaciated Appalachia, reaching the mountains of Virginia and West Virginia in the latter half of the 19th century and then extending southward into the Carolinas, Tennessee, and Georgia during the first half of the 20th century. House wrens have been known to fight with Bewick's wrens, and in areas where the Bewick's wren has declined, the house wren has increased.

This explanation, however, is built on circumstantial evidence and ignores the fact that Bewick's wrens disappeared from some areas before house wrens arrived. Moreover, the natural ranges of the two species overlap over large portions of the country. The starling, house sparrow, and song sparrow have also been cited by some ornithologists as possible competitors with the Bewick's wren, but with little supporting evidence.

The decline of the Bewick's wren does not appear to be correlated with severe winters or other weather abnormalities. The use of persistent pesticides in agricultural lands provides another possible explanation for the wren's demise, but in places like Tennessee the wrens were vanishing before the use of pesticides such as DDT was widespread. Two other possibilities — the loss of wintering habitat or the spread of some virulent disease — have not been investigated in any depth and are pure conjecture.

Any or all of these factors may have played a role in the decline of the Appalachian Bewick's wren. But we also must consider the fate of the wren from an historical perspective. Prior to the arrival of European settlers, most of the range of the Appalachian Bewick's wren fell within the domain of the great eastern forests. Until settlers began clearing the forest in the 18th, 19th, and beginning of the 20th centuries, Bewick's wren was probably restricted to steep hillsides, cliffs, rock outcrops, and other places where trees naturally gave way to openings and thickets. It became common only when the region was settled and the forests had been replaced with farms. In this respect the Appalachian Bewick's wren is no different from the chestnut-sided warbler, grasshopper sparrow, and other open-country birds that have benefited from the settling of the Appalachians.

But time took its toll on the hardscrabble farms of Appalachia. As urban centers expanded, many farms were abandoned and eventually reclaimed by forest. Wren populations grew smaller and more isolated until they began to wink out. This hypothesis does not account for the magnitude of the decline or the fact that much unoccupied but seemingly suitable habitat still exists. Nonetheless the regeneration of the once-cleared forests is surely one reason why Appalachian bird watchers have little trouble finding pileated woodpeckers but look in vain for Bewick's wrens.

Disappearing birds often provide simple but powerful conservation lessons: continue logging old-growth forests and the spotted owls will disappear; spray DDT and watch the peregrine falcons vanish. But the lessons to be learned from the Appalachian Bewick's wren are tougher to find — unless *that* is the lesson. Sometimes, if we're not watching very carefully, a species will slip through our fingers, leaving us with lots of guesses and no answers. And no little brown bird to investigate the pigsty, explore the garden fence, and pour forth one of the sweetest songs that ever was heard. ☐

Further Reading

Bartgis, Rodney L. "A petition to list the Appalachian population of Bewick's Wren as endangered." Annapolis, Maryland: Maryland Natural Heritage Program, 1986.

Maryland's Natural Heritage: Information About Rare Species and Significant Habitats, No. 5. Annapolis, Maryland: Maryland Natural Heritage Program, 1989.

SCANNING FOR OPTICS II

Richard E. Bonney, Jr. and Kirstie Forbes-Robertson

TODD CULVER

Rick Bonney and a band of Lab birders survey the field of optics once again. This time the scope market receives unblinking scrutiny.

They all groaned when we asked for help. Probably they recalled the time two years past when we coerced them into testing and ranking 22 models of binoculars, a venture that consumed several days. However, recalling the result of that effort — the most sought-after article this magazine has ever printed ("Scanning for Optics," Autumn 1988) — we were adamant. We waited for the first gorgeous day of spring, set up 20 models of spotting scopes in the warm sun, and invited six tractable Lab staffers to come outside and offer their opinions. (If you ever need to do this yourself, try free pizza.)

We knew from the start that this review would be less objective than our binocular study. For one thing, spotting scopes are harder to compare. Various models of binoculars represent mostly apples with a few stray oranges, but the various models of scopes suggest apples, oranges, bananas, even a few mangos and kiwis. Each model has strengths and weaknesses, and choosing one is largely a matter of personal preference. Still, we felt confident that careful comparisons in the field would yield information helpful for birders selecting a new scope. So in early spring, 1990, we contacted all the major optical companies. We told them of our upcoming review and asked them to lend samples of their best scopes for birding. Most of the companies eagerly complied, and we were immediately inundated with a frightening collection of glass.

Next we mounted all the scopes on tripods, set them up in a field near Sapsucker Woods, and assembled the reviewers — Rick Bonney, Todd Culver, and Kevin McGowan (all members of the Sapsuckers, the Lab's Big Day birding team), and Greg Butcher, Jim Lowe, and Dave Nutter, seasoned birders from our Bird Population Studies program. Then we ran our tests. Logistical support, including pizza delivery, was provided by Crow's Nest Birding Shop assistant Amy Benjamin.

And the tests themselves? Using a series of targets — eye charts, bushes, telephone poles, and the front license plate on Amy's car — we started by ranking all the scopes on the quality of their optics (clarity and brightness of image). Then we went back and adjusted the rankings to take into consideration such important factors as focusing ability, field of view, depth of field, and ease of operation. These criteria reflect each scope's suitability for birding. To prevent preconceptions from influencing our judgment, Kirstie Forbes-Robertson had blotted out the brand names with wads of masking tape. Some testers recognized certain models even in disguise, but in general, most of us did not know what brands we were testing until the ranking was complete. Finally Todd, Kevin, and Rick took eight of the top-rated models to the annual World Series of Birding in New Jersey. There the scopes received a further workout and the rankings were adjusted a bit more.

The final ranking is shown in the accompanying chart. We have also summarized our opinions of each scope. Remember, though, to use this information only as a guide. As we said in our bino article preferences in optics are indisputably subjective. If at all possible, please test any prospective purchase in the field before making a lifetime investment.

Kowa TSN-4 and TSN-2

These scopes are the winners, hands-down. Everyone who looks through a Kowa exclaims over its clarity and brightness of image. Sapsucker team member Ken Rosenberg, watching a semipalmated sandpiper through a TSN-4 at Cape May, marveled, "I can see what it's thinking!" Kowas are light, easy to use, and a joy to focus. The bayonet-mount eyepieces interchange in a snap, and a sliding lens hood reduces glare. Five eyepieces are available: a 20x wide angle, a 25x, a 40x, a 20–60x zoom, and a 25x long-eye relief. All are excellent. We recommend the zoom because it offers the most versatility and, unlike the zoom lenses from many other manufacturers, provides a clear image even at high power. Eyeglass wearers will appreciate both the zoom and the 25x long-eye relief, each of which provides a wide view even with glasses in place. Our only criticism of these scopes: the lens caps are wimpy.

Now the big question. Is the TSN-4 really $700 better than the TSN-2? The only structural difference between the two models is a fluorite coating on the lenses of the 4, which does seem to aid performance under certain conditions—low light, extreme glare, and very long distances. The 4 also provides a slightly better image at higher power. So our answer is a qualified yes — if you're the kind of person who can spend over $1,000 on a scope, then it's probably worth it.

Nikon ED II Fieldscope

Here's a scope that took us by surprise. We all knew that Nikon makes some very fine optics, but none of us had ever tested one of their scopes. The one we received—an ED II Fieldscope with a 20–45x zoom eyepiece—is excellent, and we had to pry it out of Todd Culver's hands at the end of the World Series. Even though it's considerably smaller and lighter than a Kowa the Nikon's image is comparable, and the zoom lens maintains excellent clarity at all powers.

We did note a couple of problems, however. The focus ring, which encircles the entire scope, is awkward to handle, and when moved it causes the scope to shake excessively. Also, the depth of field is unusually shallow and the lens caps are flimsy. Back on the plus side, the price includes a padded cordura case.

Optolyth TBG80

Here's another scope that surprised us. We thought we had identified all the best scopes when we looked through this one fitted with a 20x lens and discovered a bright, clear image that rivaled that of the Kowas. In fact this scope looks a lot like a Kowa. Closer inspection of the Optolyth and trials of the interchangeable eyepieces revealed some significant differences, though. The focus wheel turns more stiffly than on the Kowas, making focusing more difficult. The field of view is much smaller, especially at high power, which decreases the amount of area visible without moving the scope. The depth of field is slightly shallower, there is more loss of image for eyeglass wearers, and the image doesn't sharpen up as well as it might at high power. Finally, the eyepieces are threaded, which is less convenient than the bayonet-style attachment of the Kowas. Still, this is a very good scope. It comes with rubber armoring, a sliding hood, and durable lens caps which both Kowa and Nikon should examine carefully.

Mirador SSD

The Mirador SSD is a versatile scope with a very good image. We tested it with three eyepieces: a 22x wide angle, a 20–60x zoom, and a 20x long-eye relief. All worked well. The long-eye relief was excellent for use with eyeglasses, and the zoom held its clarity at high power, although the image darkened a bit more than it should. The focus was a bit stiff. This scope can't match the Kowa TSN-2, but at discount dealers it might be considerably less expensive. It's worth checking if your wallet is thin. (Note the model carefully here. We also tested a Mirador SIB, a fixed-lens scope that was light and compact but whose image just wouldn't sharpen up.)

Bausch & Lomb Elite 22x

Bausch & Lomb has done it again. Just as their Custom Compact binoculars were the first small glasses affording full-sized performance, their compact 22x Elite outcompetes many scopes twice its size. The Elite's image is not quite as clear as some of the other scopes rated here, but its light weight, brightness, simplicity, and excellence for eyeglass wearers bring it up the scale. In addition, the Elite is completely waterproof. The lens caps are decent and the canvas case does not need to be removed when the scope is mounted on a tripod.

Questar Field Model

The legendary Questar. There's no question that for the right application this is a fantastic scope; the image it presents is probably as bright, clear, and large as is possible. For birding, however, the Questar has limited application. The one we tested has just three magnifications—6x, 50x, and 80x—which means that we flipped immediately from a power too low for practical scanning to one that is too high. In addition, the high-power image affords a tiny field of view and shallow depth of field, and the scope is fat and heavy, rendering it awkward in the field.

But there are times when the Questar is indispensable. During the World Series of Birding, the Lab team spied a white blob on an old water tower. Rick put his trusty Bushnell Spacemaster on it at 22x — still a white blob. Kevin tried the Kowa TSN-4 at 60x and saw a white blob that might be a large bird. Finally Todd trained the Questar on it, flipped to 80x, and got a crystal-clear image of a roosting barn owl.

Celestron C-90

The C-90 is sometimes called the "poor-folks' Questar" and it bears many similarities to it. Like the Questar it's a squat, heavy, mirror-lens scope that provides a very bright and very clear image but has a small field of view. Unlike the Questar, the standard eyepiece affords just one magnification, 33x (although an 8x "finder scope" is attached to the main scope). On the plus side, 33x is much better for scanning than the 50x or 80x of the Questar. On the down side, 33x is not always powerful enough for distant identifications. Also, the focus ring on the Celestron encircles the entire scope and is awkward to handle compared with the simple little knob on the Questar. Nevertheless the C-90 offers a lot of scope for the money, and if you're hooked on really high power at an affordable price, you might investigate the C-90 with some of its optional eyepieces.

Zeiss 30x60 B/GA

This scope was a bit of a disappointment. Considering the price and the Zeiss reputation, we expected it to be really great. Unfortunately the image, while bright, is simply good, and with its 30x fixed lens, the scope is not particularly versatile. It does seem ruggedly built, and it's quite compact. Overall a good scope but outclassed by several that are much less expensive.

Bausch & Lomb Elite 15–45x zoom

Here's another version of the Elite, this time fitted with a 15–45x zoom lens. We had tested the 22x model first, and seeing what a fine scope it is, we set up its 15–45x counterpart eagerly, sure that we'd found a great compact zoom. It's not. Even at 20x the image is less clear than the nonzoom model, and the higher you crank, the worse the image becomes. Still, this is a good scope. Like the 22x, this Elite is waterproof.

Bushnell Spacemaster

The Bushnell Spacemaster continues to hold its place as the best of the inexpensive scopes, and it's an excellent choice for birders on a budget. Several eyepieces are available; we tested the 22x wide angle and the 15–45x zoom. Stick with the 22x. The zoom is great in concept but, like the zoom Elite, this lens doesn't provide a really sharp image at any power. In contrast, the 22x offers a clear, bright image more than acceptable for the price. (If you really want a zoom, consider upgrading to the Mirador SSD.) The Spacemaster is also durable and fine for eyeglass wearers. (Note: the zoom eyepiece is not removable in the black armored waterproof version of the Spacemaster, and the zoom lens cannot be used for photography. Also note: the Spacemaster II is an entirely different model, which we did not test.)

Optolyth 22–60x70 (19040)

When we unpacked this scope we were baffled; we just couldn't get it to work. After several moments of head scratching we finally realized that this scope is of the "drawtube" construction, meaning that it has to be extended like an automobile antenna before any image can be seen. We sure felt silly.

When we finally did get an image in the zoom lens it was excellent—one of the clearest and brightest of all scopes tested. Unfortunately the attractiveness of the super image was offset by some problems. The field of view was tiny, even at low power. Adjusting the zoom caused the focus ring to move. And finally, the length of this scope when fully extended caused it to shake even in light wind. We've heard that drawtube scopes are the optics of choice in Europe, but we couldn't get comfortable with them.

Optolyth also sent us samples of another of their removable eyepiece scopes (the TB80) and a fixed eyepiece scope (the 22x70, model 19020). Both we judged inferior to the one discussed here.

Swarovski 30x70 NZ and 25–40x75 NZ

Here are two more of the drawtube scopes. We didn't care much for these either, although we might have some kind of irrational bias against these European-style models. Essentially these two Swarovskis are the same scope, one with a 30x fixed lens, the other with a 25–40x zoom. We found the image to be a bit sharper through the fixed lens, although if we had to choose one we'd probably opt for the versatility of the zoom. Both scopes are equipped with very durable lens covers.

Celestron C-60

Another disappointment. After viewing the bright, clear image of the Celestron C-90, we had high hopes for their 60mm nonmirror scope. Its image, however, is nothing special. It's dark and only moderately clear. Also, the rubber coating smells terrible.

Meade Pathfinder II and Swift Searcher

These last two scopes just don't provide an image sufficiently sharp to see birds clearly enough for accurate identification, and none of these scopes' good features can make up for this shortcoming.

MAKING THE CHOICE

What should you look for when choosing a scope? Here are some guidelines.

Optical clarity—For many observers a scope's ability to provide a crystal-clear image of distant birds is the most important consideration. All the scopes we liked best offer excellent clarity, that is, they have high resolution with a minimum of color distortion. Some scopes near the bottom of our ranking also offer excellent clarity but were down rated for other reasons. See the summaries of each scope for further information on this subject.

Price—Remember that a scope is often a lifetime investment.

Magnification—Most of the time, a 20x scope gives sufficient power to identify and enjoy distant birds. Higher power can reach farther across a marsh or higher into the sky, but it also magnifies heat shimmer and wind tremor, creates a darker image, and reduces the field of view (the amount of area visible through the scope at one time).

But there are times when 20x just won't do, and that's when interchangeable or zoom eyepieces come into play. Zooms are more convenient than interchangeables—you simply locate a bird at low power, then crank up the magnification until you can see the whites of its eyes. Frequently, however, zooms lose their clarity at higher power whereas interchangeables do not. Again, see further discussions in the accompanying scope summaries.

Objective lens diameter—In general, bigger diameters produce a brighter image, which is especially important at dawn and dusk, on cloudy days, and when using high power. Brightness is also influenced by the overall quality of a scope's optics, however. Although 70mm and larger objectives are becoming more common, several high-quality 60mm scopes remain sufficient for most birders.

Size and weight—How are you going to use the scope? If you're a car birder, size and weight are not particularly important. In fact, a heavy scope can provide a better image on windy days. But if you like to carry a scope in your backpack, compactness could be your most important consideration.

Brand and Model	Overall Rating	Sugg. Retail Price ($)	Magnification (×)	Objective Lens Diameter (mm)	Approx. Length (in. without eyepiece[A])	Approx. Weight (lbs. without eyepiece[A])	Suitability for Eyeglass Wearers	Waterproof	Armor	Case	Optional Camera Adaptor
Kowa TSN-4	1	1,170[B]	20–60[D]	77	15.0	2.9	OK, E[G]	N	N	O	Y
Kowa TSN-2	1	480[B]	20–60[D]	77	15.0	2.9	OK, E[G]	N	N	O	Y
Nikon ED II Fieldscope	1	1,100	20–45	60	11.0	2.0	OK	N	N	Y	Y
Optolyth TBG80	2	1,080[B,C]	20–60[D]	80	15.0	3.0	P	N	Y	O	Y
Mirador SSD	2	441[B]	20–60[D]	60	10.5	2.0	P, E[G]	N	N	O	Y
Bausch & Lomb Elite 22x	2	576	22	60	12.5	1.4	E	Y	N	Y	N
Questar Field Model	3	2,065	6, 50, 80[E]	90	11.0	4.0	P	N	N	Y[I]	Y
Celestron C-90	3	778	33[E]	90	8.0	3.5	P	N	N	Y[I]	Y
Zeiss 30x60 B/GA	3	1,365	30	60	8.0	2.2	P	N	Y	N	N
Bausch & Lomb Elite 15–45x	3	720	15–45	60	12.5	1.4	OK	Y	N	Y	N
Bushnell Spacemaster	3	312[B]	15–45[D]	60	10.5	2.7	OK	N[H]	O	O	Y
Optolyth 22–60x70 (19040)	4	1,200[C]	22–60	70	11.0[F]	3.0	P	N	N	O	Y
Swarovski 25–40x 75 NZ	4	1,000	25–40	75	13.0[F]	3.8	P	N	Y	Y[J]	Y
Swarovski 30x–75 NZ	4	825	30	75	13.0[F]	3.4	P	N	Y	Y[J]	Y
Celestron C-60	4	418	25	60	13.5	2.2	P	N	Y	N	Y
Meade Pathfinder II	5	299	15–60	60	17.5	3.1	OK	N	N	N	Y
Swift Searcher	5	398	20–60[D]	60	11.0	3.0	OK	N	Y	N	Y

A — Unless eyepiece is built in
B — Does not include eyepiece
C — None listed — price estimated from dealer cost
D — Depending on eyepiece used
E — Standard eyepieces; others may be available
F — Closed
G — With long-eye relief eyepiece
H — Except black-armored model
I — Hardshell
J — Built in

1 = Excellent
2 = Very Good
3 = Good
4 = Fair
5 = Poor

Y = Yes
N = No
O = Optional
E = Excellent
OK = OK
P = Poor

For eyeglass wearers only — Some eyepieces work great for observers wearing glasses, but many are terrible — when you press your glasses up to the lens, you get an image about as wide as a spaghetti noodle. If you want to leave your glasses on while scoping, your best bet is to buy a scope with a "long-eye relief" eyepiece, which allows a wide image even when your eye is forced back from the lens. Our chart notes the models for which long-eye relief lenses are available and indicates the suitability of each scope for eyeglass wearers.

Water resistance — Scopes generally are not designed to be water resistant, and most will fog up when used in really wet weather. True waterproofing demands a process called nitrogen purging, and of the scopes we tested, only the Bausch & Lomb Elites and one version of the Bushnell Spacemaster are waterproof. You might consider this fact if you're headed into monsoon country on your next expedition.

Armor — How often do you drop your scope?

Case — You should keep your scope in a case when it's not in use. Many of the models we tested come with a case; for most others, optional cases are available.

Camera adapter — Most scopes can be adapted into telephoto lenses for use with 35mm single-lens reflex cameras. However, most serious photographers prefer telephoto lenses specially designed for photography.

One last point — The performance of any scope is highly affected by the stability of the tripod on which it is mounted. In fact, you're better off with a poor-quality scope on a good tripod than a great scope on a flimsy one. While conducting our tests, we switched the scopes from tripod to tripod to avoid such bias. The take-home message — if you buy a good scope, get a solid tripod. And if your present scope doesn't seem to be up to snuff, check your tripod before making a huge investment in new optics. □

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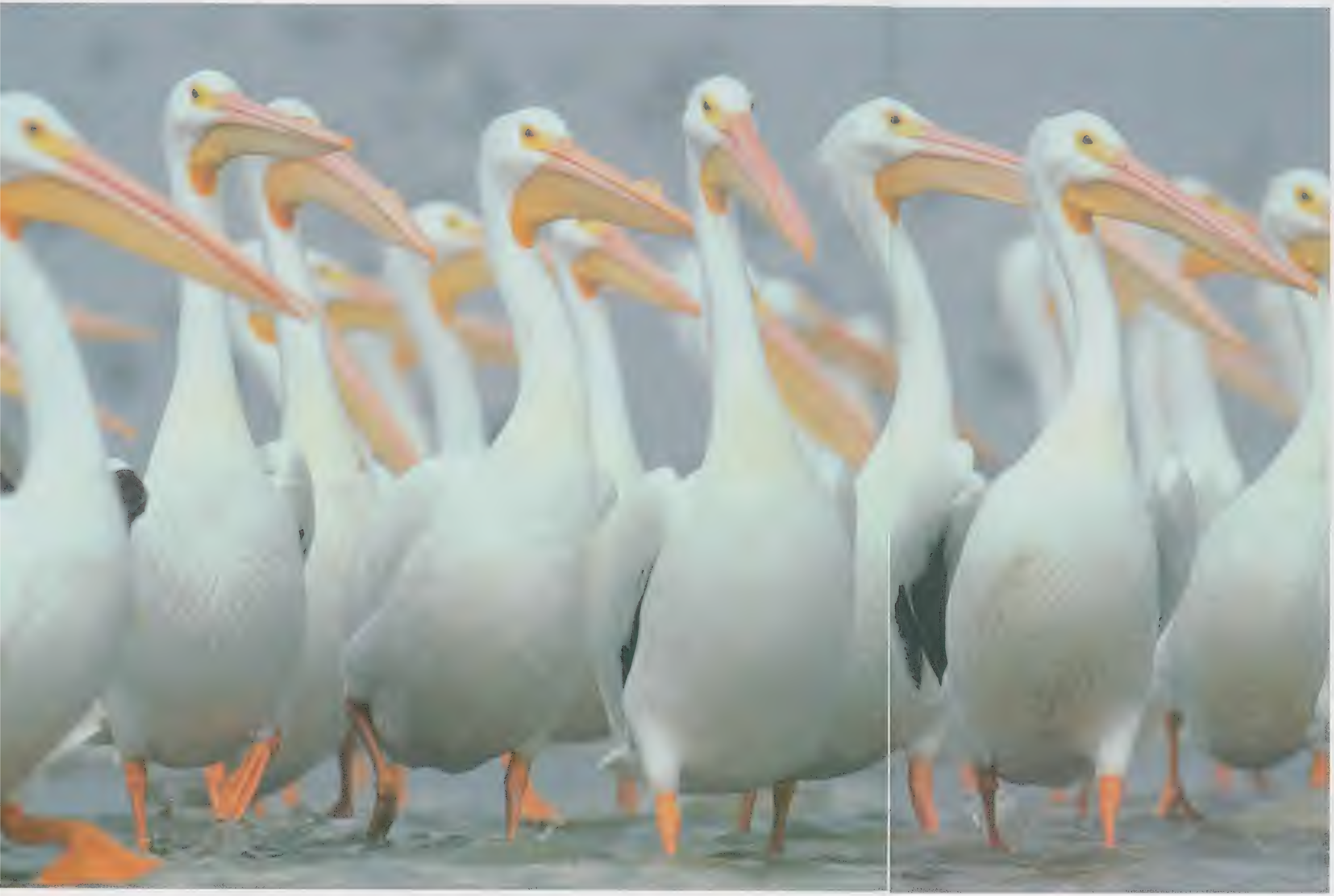

"CRAZY OLD MEN IN BASEBALL CAPS"

Photographs by Tim Fitzharris

When the indefatigable wildlife photographer Tim Fitzharris traveled to Texas in the spring of 1989, he was looking for endangered Attwater's prairie chickens. The pelicans were an unexpected bonus.

Bolivar Flats, near Galveston, Texas, is an ideal place to watch pelicans. Masses of the big-billed birds jam the beach: brown pelicans, year-round Gulf Coast residents, cheek-by-jowl with American white pelicans taking a winter vacation from their frigid northern breeding grounds.

Brown pelicans skim the wavetops in tight formation, single file, riding the cushion of air between wings and water. They play follow-the-leader, flapping, then sailing in unison with heads folded back, heronlike. Their precision flying is mesmerizing.

White pelicans rise on favorable breezes to float in lazy circles. An adult may flaunt a nine-foot span, white edged with black; the wing-tip slots, like those of vultures, remain open when the birds soar.

"Crazy old men in baseball caps," poet John Malcolm Brinnia called pelicans, an apt description of the distinctive pelican profile. A white pelican's bill is a match for its wings: massive, nay, monumental; jauntily elongated, bright orange.

Yes, a wonderful bird is the pelican. It's no doggerel myth that the bill holds more than the belly can. Together the bill and gular pouch hold a sloshing three gallons, several times more than top stomach capacity. The bill and pouch are designed, not for storing fish as cartoon strips may have led you to believe, but for snaring them. White pelicans gang up to fish the incoming tide in flotillas, dipping their wide-open bills in unison, creating a highly effective underwater fish trap.

Pelicans are gregarious on land, too. When the fishing is done they gather on sandy flats to loaf and preen, rows of stuffy gentlemen peering nearsightedly down their patrician bills. Some affect more modest poses, glancing coyly over a shoulder with head tilted ever so slightly to the side. Periodically they stretch the nine-foot wings and crane rubbery, infinitely flexible necks to rest bills neatly down the exact center of their backs.

Fitzharris found the angular repeated images of these prehistoric-looking birds "a photographer's dream" and captured these scenes for us. We hope you like them as much as we do.

—C.B.

"When I'm photographing my eyes are glued to the viewfinder. I'm concentrating totally on the birds. At the same time I'm conscious of how loud my breathing sounds, how awkwardly I operate the camera. Lying in my floating blind I got within 15 or 20 feet of these birds. It was like being in their living-room—watching them scratch and stretch and snooze. They were very wild, easily startled. Once a dog barked on the beach and pelicans came wading all around me, close enough to reach out and touch their yellow legs going by. It was as if I weren't really there."

"Bolivar Flats is a great place for birds of all kinds: skimmers, godwits, yellowlegs, small sandpipers. Once I saw a huge flock of avocets—maybe 10,000—banking and wheeling like dunlins. There was so much bird activity, flocks and singles flying about, coming and going in all directions, that I took pictures steadily for several hours. It seemed like only a few minutes. . . ."

BHL

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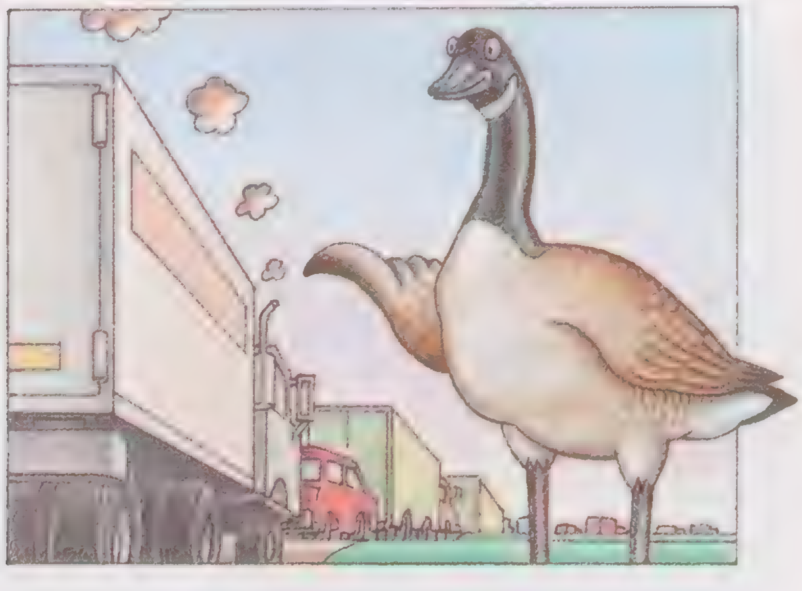
DRIVING THE CURATOR CUCKOO

She's faster than a speeding ostrich and she doesn't do windows. Bronx Zoo bird curator Christine Sheppard looks for the perfect two-word answer to every avian question.

I'm proud to work for the Bronx Zoo, but I do have some frustrations. I am amazed at what people think I know. Sometimes I'm afraid to pick up the phone. I don't mind answering questions, especially when callers have tried the library and other sources without success. The problem is that often the questions have no answer, or no one has ever gathered the information, or the callers aren't asking what they really want to know. And everyone wants a two-word answer to questions about everything from statistics to philosophy, from the very specific to the very general. But I keep trying, and one day I hope to have a computer full of answers to favorites such as these.

1. What was that birdie in the window?

New York State boasts about 400 species of birds, some rare, some common, plus any number of escaped pets and other exotics. This makes it difficult for me to give an exact answer when someone calls to ask what was sitting on a tree in Central Park or outside an office window. Details make identification a little easier. "It looked like it had polka dots" almost certainly means a guinea fowl, a chickenlike bird kept by fanciers and sometimes sold live in meat markets. "It was bright green" usually means an escaped parrot, species to be determined. "It was about the size of a robin" could mean anything. "It wasn't in the field guide" could indicate a visiting exotic or that identifying birds by looking at pictures isn't easy.



Equally challenging are the calls from people who are sure they have spotted a rare species. A peregrine falcon on Long Island proved to be a pigeon. Cranes usually turn out to be herons. My all-time favorite was the emu spotted on the parkway near the zoo. We weren't missing any emus, but we figured that anyone who knew the word "emu" must be seeing one. Our supervisor found a very excited gentleman who had trapped a Canada goose.

2. How long does a crow, parakeet, canary live?

(Translation: How long will *my* crow, parakeet, canary live?) I have two problems here. The first depends on what the caller means by "how long." I would answer the question, "What is the age record for a canary or parakeet?" differently than "What is the average age reached by canaries or parakeets?"

In most bird populations the risk of mortality is highest for the very young. Chicks must learn to find food, locate shelter, avoid predators, and sometimes migrate, all in their first year, frequently with no help. Up to 80 percent of the young birds hatched in one year die before that year is out, lowering the species' average lifespan substantially. Once a bird has survived its first year it has a much better chance of reaching its maximum age, although each season it still must contend with predation, weather, accidents, starvation, and disease.

Because captive birds do not face the elements and have good medical care, senility is one of the most im-

Christine Sheppard *Illustrations by Anthony Taber*

portant causes of mortality in zoos. We have gleaned much data from zoo animals on the maximum life span of many species.

Once the caller has determined the question, we may not be much closer to an answer. A reference book containing this information simply doesn't exist. To find out how long birds live, we could follow a group from hatching to death, or very accurately age a living population; but we can't tell the age of most birds after the first year. The upper limit of survival is different for every species since each faces its own unique mortality rate. No one knows how this limit is determined, but in general, larger species live longer than small ones: cranes live longer than canaries, for instance. I can make an educated guess from the available research, but no matter how much we know we'll never be able to predict how long a particular individual will live.

3. *Is it faster than a speeding bullet?*

People often want to know how fast a goose, falcon, or ostrich can move. (It's easy to tell about the ones who call from a bar. It's a bet. But I do wonder about the others.) Once past my usual quibbles (the speed in a sprint, a marathon, or when cruising normally?) we find, not surprisingly, that few birds have been timed on the track. To measure a flying bird's speed, I would have to calculate the length of time it took it to fly a known distance, or keep pace in a craft with a speedometer. Knowing if there's a head or tail wind is useful, as is a radar gun.

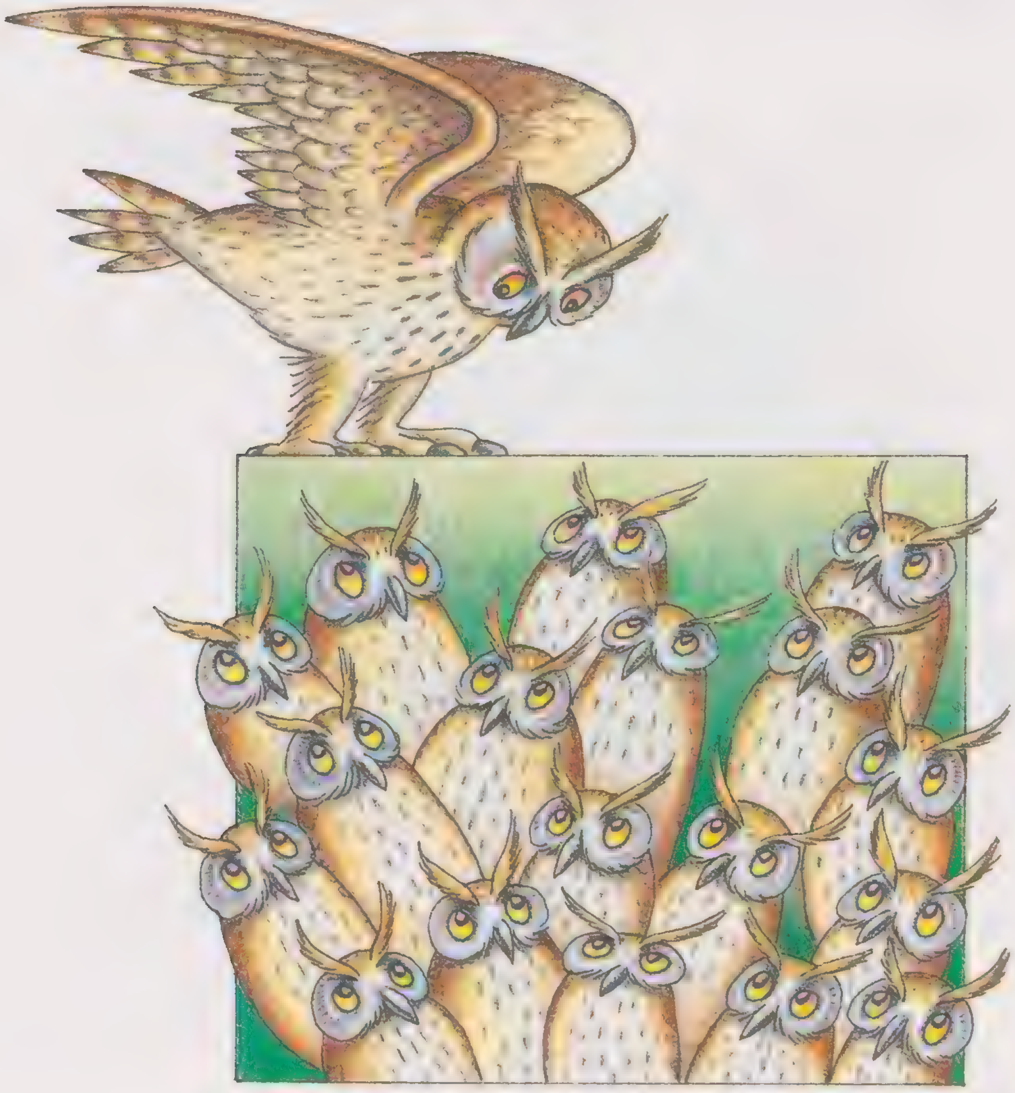
Some birds don't fly at all. People pacing ostriches and rheas in jeeps report that the birds can reach over 40 miles an hour. Since the jeep probably introduces an element of panic, this may be a maximum that the birds can't maintain for long. Of the flyers, many are built for comfort, not for speed. A startled turkey may blast a few hundred yards, but most of its life is spent on the ground.

How fast can a fast bird go? Speeds reported for racing pigeons vary from 30 to 80 miles an hour. Peregrine falcons make their living hunting other bird species and have the reputation for being among the world's fastest movers. Peregrines fly at about 40 miles an hour, not fast enough to catch a racing pigeon. When hunting, however, they soar, fold their wings, then dive in a high-speed stoop after their targets. With assistance from gravity some say a peregrine may reach 200 miles an hour.

4. *Do swans, lovebirds, canaries mate for life?*

Unlike mammals, most birds breed monogamously. This can be a misleading word, however, and the greeting-card notion of two mutually adoring bluebirds disguises a reality more appropriate for a soap opera plot.

Consider those bluebirds. At first sight they seem to approach the human ideal of devotion, male and fe-



male pairing in the spring and sharing the duties of nest building and chick rearing. Snoopy scientists, however, have tested blood and egg proteins to show that a typical male may father chicks from several nests, and that a typical female may lay eggs fertilized by more than one male, sometimes in more than one nest.

Ornithologists do refer to some birds as "pairing for life," but this notion can be taken about as literally as humans pairing for life. Large species like cranes and condors tend to stay with the same mate year after year. If a mate dies, however, the remaining bird will usually find another mate if one is available. Especially at the beginning of the breeding season, pairs may separate and take new partners.

5. A group is a what?

People who for generations have lived and worked with certain animals have given groups of them special names: a school of fish, a pride of lions, a pod of whales, a gaggle of geese. Not every species has a group name because not every species spends much time in groups. In spite of this I get many calls asking what the word is for a group of ostriches, gulls, cardinals. I admit that I'm not omniscient and that names of groups of birds exist which I have never encountered. The fact of the matter is, though, that most of the time a group of birds is called a "flock," at least by biologists, and I can do nothing to change that. I certainly did not mean to be rude to the caller who wanted the word for a group of owls. It's not my fault that owls are solitary creatures that never flock. The only time they get together is to pair during the rearing of owlets.

A corollary is that only a few species have special names for males, females, and chicks. Swans have cob, pen, and cygnet; geese have gander, goose, and gosling; dozens of names have been given for falcons at every stage of development. Peafowl can be stretched to peacock, peahen, and peachick, if you must, but ostriches have male ostrich (or perhaps Father Ostrich), female ostrich, and ostrich chick.

6. Where does a 500-pound canary sleep?

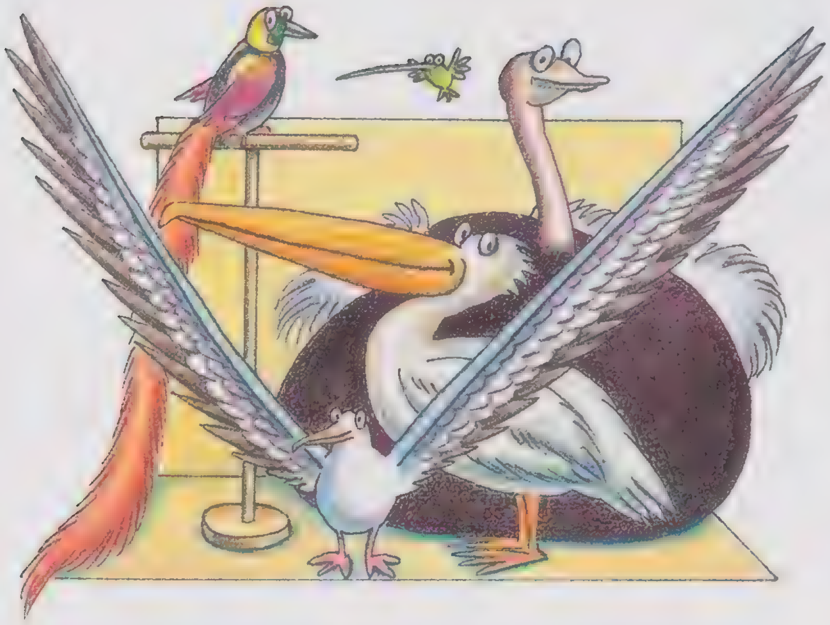
Anywhere it wants.

7. What bird is the biggest, smartest, prettiest?

Some of these are more easily answered than others. I can answer biggest once I've determined what "biggest" means. Scientists like to measure things and birds have a lot to measure. So all I have to do is dig out the measurements, often from articles published in other centuries or languages.

The heaviest living bird is the ostrich. An adult male can weigh 350 pounds. The bird with the widest

Scientists like to measure things, and birds have a lot to measure. Who has the longest bill? Longest tail? Heaviest? Widest wingspan?



wingspan is the wandering albatross, 13 feet from tip to tip in one individual, with the Andean condor taking that title if we count only land birds.

Who has the longest beak? If you mean longest beak absolutely, a pelican's bill can measure 14 inches. Longest proportionately? A saberbilled hummingbird's bill is two inches long, the length of the rest of the bird altogether. Longest tail? No, not the peacock, those feathers are tail coverts, beneath which is a relatively short and boring tail. A leading contender is the ribbon-tail bird of paradise, a 10-inch bird with streaming tail feathers almost three feet long.

8. Where do they go?

A caller queries, "Why don't I ever see dead pigeons? Live ones are everywhere." Could it be you never look down? I agree, the landscape is not littered with dead pigeons, but if you really want to see a dead pigeon, go where pigeons live and spend their time in groups: subway underpasses are a good bet. Even in a city, though, nature is interconnected. Pigeons fall prey to hunting predators—cats, children, hawks, and scavengers—rats and their ilk. Sick or dead pigeons usually don't lie around for long. They are part of a food chain, the oldest form of recycling.

9. The pigeon nesting on my air conditioner isn't sitting on her eggs.

What should I do? NOTHING! Everyone needs a break. Birds frequently leave their nests unattended, especially before they have finished laying. If they start to incubate when the first egg is laid, that egg will hatch long before the last one. Birds do abandon their nests sometimes. They may have incubated for the regulation period without results: the eggs could have been infertile or failed to hatch for one of many reasons. Perhaps a parent bird died and its mate gave up. In any event a human, even with the best intentions, can do very little. Pigeons feed their newborn chicks crop milk, a secretion produced by special glands that is approximated by nothing available in any supermarket.

10. A dead bird is in my backyard. When will you pick it up?

I had to inform that caller that the Bronx Zoo does not provide such a service. We don't do windows, either. □

Christine Sheppard has been at the Bronx Zoo for 12 years. She is coordinator of the species survival plan for the white-naped crane and keeps the international studbook on that species.

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IBIS CAFETERIA

Susan McDowell

ROBERT VILLANI

At a South Carolina research station, male white ibises find that the "special of the day" is within reach.

Males are frequently portrayed as the dominant sex of our species. In many societies it is the men who traditionally have gone to war and the women who have remained behind. The role of Indian warrior calls for strikingly colorful attire. Native American history is rich in images of the males prepared for war dressed in colorful paint and feathers. Physical strength is often associated with male dominance and has been important in maintaining traditional roles in some cultures. In our own Western society basic size requirements for firefighters exclude many women.

Nature shows us many impressive displays associated with gender differences. A male peacock spreads his elaborate tail feathers as he struts to impress the drab female. The gaudy male guppy outshines his plainly attired mate. In several primate species the difference in size and appearance of males and females is striking. Baboon males are nearly twice as heavy as baboon females and have a prominent mane and conspicuous canine teeth.

These species provide examples of a biological phenomenon called sexual dimorphism. One sex, usually the male, has brighter plumage or body colors, a larger body, larger appendages, or more ornamentation than the other sex. These often elaborate differences provide some advantage for the sex that displays them.

Diverse examples of sexual dimorphism are familiar to bird watchers. For instance, during spring migration the males of the American redstart, indigo bunting, and scarlet tanager show vivid colors and patterns. Their female counterparts are much less stunning. Similarly, a visit to a pond during the breeding season reveals the showy designs of male ducks such as the extravagantly colored wood duck.

In 1871 Charles Darwin proposed that between-sex differences in color or size were the result of sexual selection. He suggested that one sex, often the male, required a larger body or appendages to beat out competitors for the best territories or to achieve social dominance, and so natural selection acted to keep these traits in the species. Another possibility was that females favored the most brightly colored or strikingly adorned males and chose them as mates.

BHL

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C. GABLE RAY

Both bird and beast exhibit what's called dimorphism—the sexes aren't exactly alike. Usually the male is bigger or more colorful, traits which help him to woo and win his mate and may, incidentally, have an effect on his feeding habits. A male white ibis, above, boasts a bill 25 percent bigger than a female's. Male olive baboon, below, displays formidable canine teeth; a female would have a daintier set of choppers.

Sexual dimorphism may take a subtle form such as a difference in bill length or bone structure. Researchers who have documented these less dramatic differences have added another theory to Darwin's explanation of why sexually dimorphic characteristics have evolved. Some suggest that these differences reduce competition for food between males and females of the same species. For example, males of a West Indian species of woodpecker use their bills to probe for insects in tree bark. Female woodpeckers have shorter bills best suited for gleaning insects on the surface of the same tree.

Other scientists, however, believe that ecological benefits are only secondary effects of sexual selection. They agree with Darwin that differences between males and females developed as a result of sexual selection, not because natural selection acted on foraging behavior. These scientists do concede that the change in form that results from sexual selection can provide unexpected benefits to one sex.

White ibises, long-legged wading birds that nest in colonies along the coast and on offshore islands in the southeastern United States, might provide an example of the double benefits of sexual dimorphism. Although male and female ibises have similar plumage, males are larger and their bills are about 25 percent longer than the females'. The males' large bodies and long bills appear to play an important role in courtship. During the courtship dance the male and female delicately intertwine their long necks and bills. As competing males vie for the attention of a female, the males often engage in aggressive displays. They will fly up, face, and jab their long bills toward each other. Here a longer bill may be advantageous.

Differences in ibis bill size may influence behaviors other than courtship. As a research ecologist at the Savannah River Ecology Laboratory (SREL) in South Carolina, I studied the influence that sexual dimorphism may have on the feeding behavior of the white ibis. I collaborated with Dr. Keith Bildstein of Winthrop College in Rock Hill, South Carolina.

Salt marshes in the southeastern United States are nature's own smorgasbord, containing a great variety of foods for many species of birds. Ibises are a common sight on the marshes where they probe the mud for insects and crustaceans. The sand fiddler crab is the ibises' favorite dish in places where it is abundant. We designed our research to take advantage of this preference, choosing fiddler crabs to be the experimental prey.

Here's the twist: fiddler crabs show sexually dimorphic characteristics, too. The female crab has two identical claws; the male crab has one claw like the female's and one very large claw. Both male and female crabs excavate burrows as a refuge from predators and extreme temperatures. The burrows also make a secure place to engage in courtship and protect the young. The male crab sits at the entrance to his burrow waving his large claw to discourage intruders—other fiddler crabs—from attempting a takeover of his territory. He also uses the claw in visual displays to attract females. Researchers believe the claw might be a valuable defense against such predators as raccoons and large wading birds. The male crab might dissuade the potential predator by waving his claw or, more di-

GERRY ELLIS (ELLIS WILDLIFE COLLECTION)

rectly, by grabbing the hopeful diner in a painful pinch.

To get exact measures of ibis feeding behavior, we needed a captive flock and a place for them to forage. We hand-reared seven white ibises at SREL as part of another project conducted by Toni DeSanto, a graduate student from the University of Georgia. The birds were taken as day-old nestlings from a large breeding colony on Pumpkinseed Island, near Georgetown, South Carolina, and hand-fed until they were able to feed on their own. Once fledged, the birds were housed in large outdoor aviaries at SREL. After a few months the birds learned to recognize my voice and would fly to the aviary door, begging and squawking for me to come inside and feed them. One especially bold ibis named Willard always muscled his way to the front to probe my pockets and shoes for food. He became quite adept at untying my shoelaces but was never successful in retying them.

When the birds were 10 to 12 months old I began to observe their foraging behavior. At the same time, Bildstein conducted field studies of ibis foraging. We were encouraged to see that even though our birds had been reared in captivity, their behavior was typical of free-ranging individuals of this species; we didn't want our study to record behaviors which were an artifact of the ibises' captive upbringing. I then made my preparations to test for differences in foraging behavior between males and females. I planned to compare their success at capturing fiddler crabs from burrows of different depths.

One of Bildstein's students made plaster casts of fiddler-crab burrows in the marsh adjacent to the ibis breeding colony in order to measure their length and diameter and record their shape. We used this information to design a system which would mimic natural fiddler crab burrows, a system we called the ibis cafeteria. The cafeteria was a plywood table into which numerous wooden plugs had been driven. Plastic tubing of various lengths could be attached perpendicular to the surface of the table; each length of tubing simulated a crab burrow. We used three different burrow depths that were typical of naturally occurring burrows. The deepest was about five inches.

The ibises needed time to get used to cafeteria-style dining. After all, I'd had them eating out of my hand. So I spread the cafeteria table with some of their favorite food items: ibis chow, freshly thawed crabs, and crayfish. Shy at first, the ibises learned that the cafeteria was the best place for good food. Once they'd learned the ropes I plugged the bottoms of the burrows with corks and placed a live fiddler crab in each one. The ibis cafeteria was officially open for business.

The ibises scrambled to the cafeteria and probed the burrows for the crabs. Since ibises normally forage in groups, I gave all seven ibises access to the cafeteria and watched one bird while it made several probing attempts, then focused my attention on another individual's behavior. I noted the sex of the ibis, the depth

BIG MAMA

The tiny warbler was just a snack. The male sharp-shinned hawk brought it to the nest, neatly plucked and decapitated, to be torn apart and shared by the brood of nestlings. Later his mate brought a fat robin that had lingered a fatal second too long at a backyard birdbath. The robin, weighing 10 times as much as the warbler, made a more substantial meal.

Indeed female sharpies regularly catch robins and other medium-sized songbirds, while the males take smaller prey. This difference in prey choice is a reflection of a physical difference between the sexes. Sharp-shin females are longer and heavier than males.

In species where the sexes are different sizes, the larger of the two is usually the male. Scientists believe this pattern is a result of sexual selection: a large male has an advantage over smaller competitors in securing a mate. But in raptors—hawks, eagles, and falcons—the pattern is reversed. Although females don't compete for mates, typically they're larger than males. Why?

It may be a way for two powerful predators to extract the maximum amount of nourishment from their territory. Raptors consume "alert" prey, birds and small mammals that can spot an attacker and take evasive action. Two hawks hunting for the same prey over the same territory can interfere with each other's success. But if they hunt for different prey, there's less interference.

Usually the male supplies the family with food while the female lays and incubates the eggs and broods the nestlings. Being small is actually to the male's advantage in this situation. Small birds are more agile fliers than larger ones, so they're more successful hunters. And since small prey, sparrows or mice, usually are more numerous than larger prey, thrushes or squirrels, the male catches more, and doesn't have to search so long or so hard to get them.

Meanwhile it's to the female's advantage to be big. She can lay larger eggs which will hatch into large, robust nestlings; she does a better job of incubating the clutch; and when nest predators approach she puts up a formidable defense. When the fledglings are old enough to be left unsupervised, she joins the hunt, bringing home bigger game for her growing offspring than can her mate. Thus the size difference between male and female sensibly facilitates the division of labor during the reproductive season.

Some scientists dispute this explanation, however. Falcon expert Tom Cade points out that raptors come equipped with powerful beaks and talons and a fierce disposition, and that the hawks and falcons with the greatest size dimorphism are those that specialize in capturing birds. A large male raptor might mistake a smaller female for a potential dinner. Over evolutionary time, natural selection has acted to favor large females, so that such deadly confusion is avoided.

Scientists are fascinated by the exception to the rule. In the world of birds, a big mama doesn't fit the logic of "usually males are larger." What's the correct explanation? The debate continues unabated. In some raptor species the size difference between sexes is slight, in others, great. A single explanation for the variety of situations is unlikely. —C.B.

PRISCILLA CONNELL

CHARLES W. MELTON (2)

of the burrow it probed, and whether or not it captured a crab. I also knew the sex of the crabs since I had placed either male or female fiddler crabs in the burrows during each feeding trial.

I found that male ibises were more successful than females at taking crabs at all burrow depths. The difference in probing success was most pronounced for the deepest burrow. The probability of a successful probe from a deep burrow was 45 percent for male ibises compared to only 17 percent for females. I also found that ibises preyed upon female crabs more heavily than on males. Ibises of both sexes ate twice as many female fiddler crabs as male crabs.

White ibises forage primarily by touch. They probe with their bills in the soft marsh mud or, in shallow water, move their bills from side to side until they find their prey. But sometimes they forage for fiddler crabs or insects on the marsh surface, and then visual cues are important. Bildstein and I were curious to see whether the ibises would continue to select female crabs when foraging by sight rather than touch.

For this part of the experiment we tested the ibises individually. I simultaneously placed one male and one female crab in a shallow porcelain pan and let the ibis feed. I noted which crab the ibis contacted first and which it ultimately ate.

Both sexes of ibises chose female crabs nearly four times as often as male crabs. Often an ibis would approach the male fiddler crab only to retreat after the crab threatened the bird with its raised claw. After a failed attempt to capture the male crab, the ibis usually selected the less intimidating female crab.

Why do foraging ibises reject male fiddler crabs in favor of female crabs? I made some practical observations of this predator-prey relationship that might explain the ibis behavior. On several occasions, both when the ibises were probing in burrows and when they were feeding off the surface, I saw a male fiddler crab grasp an ibis's bill with its pincherlike claw. The ibis would frantically shake its head until the crab was tossed off. Often the crab amputated its own claw, leaving it attached to the bill. The now clawless crab could scramble away and escape while the ibis raised its foot to brush the offensive claw from its bill. I presume that pinches by the male crab's claw were painful to the ibis's sensitive bill. When ibises did consume male fiddler crabs, the birds would manipulate the crab until the large claw broke from its body, then they would swallow the clawless crab.

In our experiments both the male predators and the male prey fared better than their female counterparts, presumably because of their larger appendages. The male ibises were able to capture more fiddler crabs than were female ibises. The male fiddler crabs were rejected more frequently than female crabs and thus escaped the fate of "special of the day" at the ibis cafeteria.

There may be costs associated with larger body or appendage size, however. For example, the large male ibises may need to spend more time foraging to get the calories they need than do the smaller females. And, although the male fiddler's claw may save him from predation, it puts him at a disadvantage because he can't use it to capture his food. He too may need to forage longer to meet his energy requirements.

D. BRIGGS

Above, author Susan McDowell sets a fine table for a flock of foraging ibises. Rubber tubing suspended below simulates fiddler crab burrows. Male ibises had more success than females in feeding from the deepest burrows. Sand fiddler crabs are an ibis's favorite food (bottom left) but watch out for the male (on right)—the large claw can deliver a painful pinch. Top left, ibis bills are sensitive, and birds will shake off a clinging crab.

Ibises aren't often the subject of laboratory studies. Our research allowed us to observe the ibises under experimental conditions and enabled us to document and analyze differences in foraging behavior attributable to dimorphism.

Similar manipulative studies, combined with field observations of other species, may help clarify issues surrounding the role of sexual dimorphism in contexts other than mate selection. Our work suggests that sexually selected characteristics can profoundly influence other behaviors such as foraging. The benefits and costs associated with sexually dimorphic characteristics bear more investigation.

Willard and the other ibises have left behind the bright lights of ecological research and are now living in Florida. The information we gained by studying them has added another piece to the puzzle that is avian ecology and behavior. □

In addition to her time among the ibises in South Carolina, Susan McDowell has collaborated on ecological research activities focusing on coots and other waterfowl, snakes, turtles, and alligators. She is presently an ecologist with the U.S. Environmental Protection Agency in Philadelphia.

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BARRY L. RUNK (GRANT HEILMAN PHOTOGRAPHY)

An aerial river of crows advances to the second preroost site.

CROW ROOSTS

Donald & Lillian Stokes

Crows strike most people as more intelligent than the average bird. They seem wary, savvy, communicative, and most of all, social. How much of this is our own imagination and how much is crows is hard to tell. What we can tell is that two aspects of crow behavior are particularly intriguing. One is crow roosting, and the other is all the theories written about it.

Here is what you can see. At about three or four o'clock on a fall or winter afternoon small groups of crows take off and fly in a distinctive manner. They rise above the treetops, continuously flap their wings with strong, measured beats, and move in a fairly straight line. While in the air the first group is joined by other small groups so that over a period of 15 to 30 minutes the crows form a long, loose line all flying in the same direction. These flight lines remain fairly constant and are used day after day. In our area one line roughly follows the course of a river for a spell and another follows a major highway.

On their way to the main roost site the crows will stop at two preroost sites. These can be a patch of woods, an open field, or even someone's backyard. About 20 miles from the final roost is the first preroost site. Here the crows land and are joined by other lines of crows from surrounding areas. The second preroost site is within a quarter-mile radius of the roost. Five thousand crows gather in the preroost sites in our area. We have often watched them arrive. They arrive hundreds at a time from four different directions in what look like aerial rivers of crows.

At these preroosts the crows exhibit more distinctive behavior. We have heard three calls: a short *cah*, a longer drawn out *caaaah*, and a grating, rattlelike call. No one as yet knows the function of these calls. Solving this mystery could be a key to understanding why roosting occurs.

As the birds sit and jostle among the perches the preroost is noisy. Every so often large numbers of birds suddenly fly up. As they do, the other birds become quiet. The sudden quiet, the muffled sound of wings beating, and the sight of hundreds of crows swarming about are very dramatic. The airborne birds circle low over the site for a few seconds and then land and resume calling.

Another preroost behavior is chasing; a chased bird takes a zigzag flight as it tries to elude its pursuer. Occasionally the pair rises above the preroost site and engages in an undulating flight, like the path of a roller coaster, one bird alongside or behind the other.

Finally about sundown, when all birds have arrived at the second preroost, large flocks of crows rise up silently and fly into the final roost site. For several years the main roost in our area has been behind a MacDonald's restaurant in a small grove of trees—no more than half an acre, surrounded by parking lots, malls, and large spotlights that stay on all night. Amazingly these 5,000 crows seem to disappear in the trees and become silent except for an occasional soft *cah*. We have never seen them leave, but other behavior-watchers have told us the birds do so quietly just before dawn.

Roosting behavior has fascinated scientists for decades. And answers to why birds roost have come from studies of many different species including starlings, herons, red-winged blackbirds, and robins. One theory is that the birds gain some protection in a large group; there are more eyes to spot predators. Or by huddling together birds may be able to stay warmer. These explanations do not seem to fit in the case of the crows. For spotting predators they could benefit from much smaller groups, say, 100 birds. Why fly so far for such a large group? Also, they do not perch close enough for added warmth, and sometimes the birds roost in deciduous trees when nearby evergreens would make better windbreaks.

An ingenious theory suggests that roosts are information centers where birds learn the location of food for the next day. Hungry birds follow well-fed birds out of the roost the next morning; in this way the whole population can exploit the available food in a large area.

Problems exist with this theory as well. Small groups of crows generally return from the roost to the same area each day. These extended families, composed of parents and their young from several previous years, are often territorial through the winter. Thus it does not seem that they are moving about to look for new areas with food; however, we also have a cornfield nearby and hundreds of crows show up in early winter and stay until the food is all eaten, suggesting that family groups do leave territories at least briefly to feed.

A third theory suggests that roosting occurs where food is plentiful, and that as birds come and go they stop to get extra food. Although this may be true for some roosting species, it does not appear to be true for crows, which fly directly to preroost sites where they spend more time interacting than feeding. In addition our roost is in the middle of a heavily populated area with no cornfields or other large feeding areas.

None of these theories explains the variety of calls and pair interactions that occur at the preroost sites. We wonder if these may be part of pair formation and courtship. The roosting behavior would then aid in genetic mixing since crows can stay for several years with their family and may not meet many other crows. We still wonder why roosts are so large and why the birds spend so much energy flying to and from them.

Scientists agree that theories on roosting behavior do not answer all of the questions, and that still needed is more careful observation of what happens at roosts of different species. We hope you will go out and find the crow roost in your area this fall and winter. Just look for crows flying high in the late afternoon and follow them in your car. This is how we discovered where the crows from our property went each night.

Now that we know where the roost is, we make a point of watching the birds enter the roost at least once each winter. Every time we do it we are inspired by the spectacle and impressed at how little we really understand of the complex and fascinating lives of crows. □

Donald and Lillian Stokes are the authors of Stokes Nature Guides and *The Bird Feeder Book.*

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OF SUITS AND FEATHERS

Paul L. Whittaker

Work and courtship call for different attire. Day-to-day business is best done in functional, inexpensive clothing: overalls for a laborer, the plain, gray suit of the working business person. To make ourselves attractive to the opposite sex, we may don a stylish shirt or colorful slacks or some other conspicuous garment. The expected benefit—enticing an individual of the opposite sex—outweighs the inconvenience and expense of dry cleaning.

Not having a well-stocked wardrobe, birds must go to some lengths to satisfy two conflicting interests. Fear of predation is an important element in evolution's "choice" of plumage: inconspicuous birds are more likely to survive and raise young. But they also must advertise their sexual availability and desire to prospective partners; to pass unnoticed might mean losing the chance to reproduce.

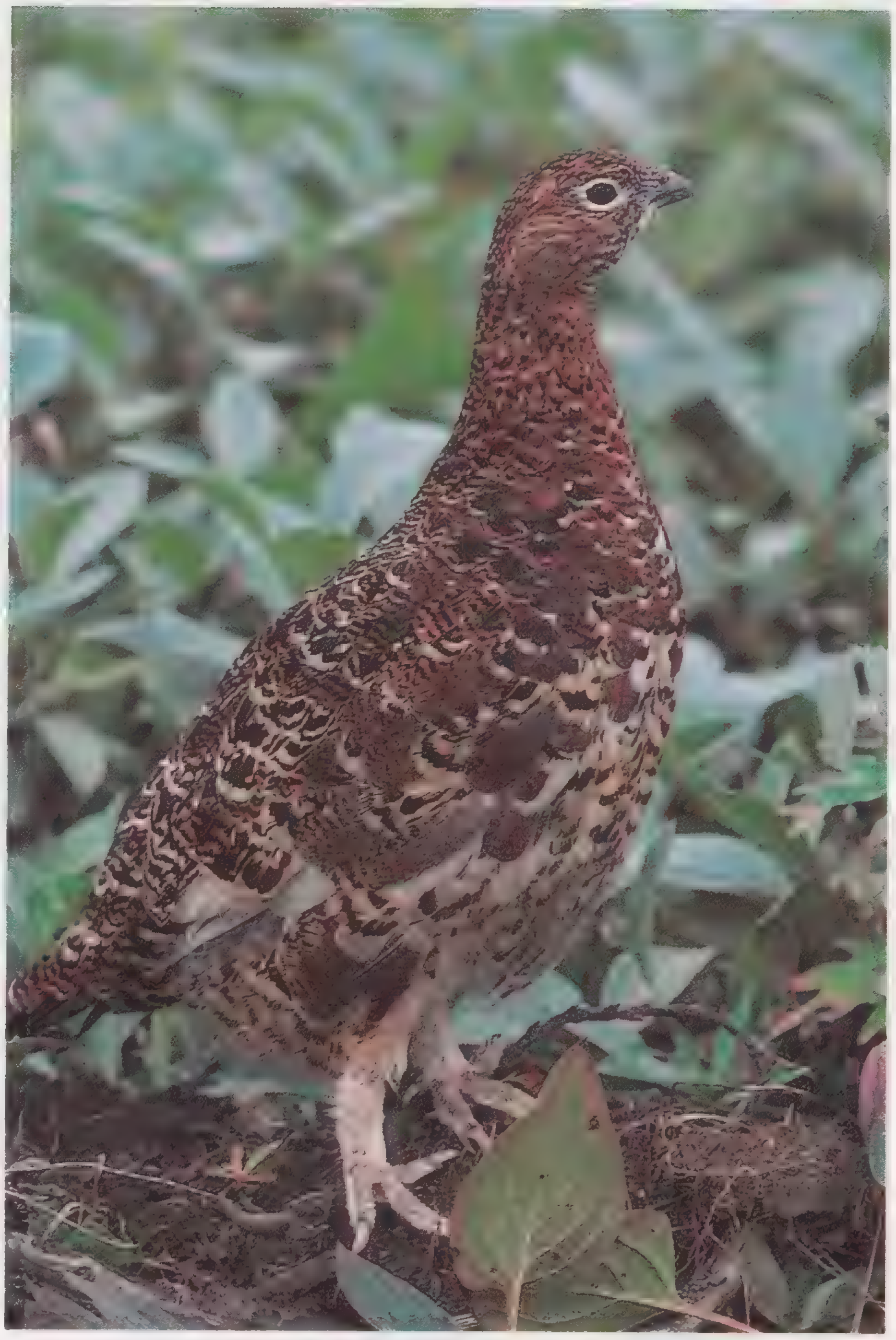
Many bird species have solved this conflict by possessing two suits of feathers: a gaudy mating plumage for spring and summer and a cryptic, functional set for the fall and winter months.

Most often it is the male bird that changes back and forth from breeding to nonbreeding plumage, perhaps because remaining unnoticed is all-important to a defenseless female warming a clutch of progeny. Some common birds that change from bright breeding feathers to dull winter ones include goldfinches, scarlet tanagers, bobolinks, golden plovers and many other shorebirds, warblers, and starlings.

One dramatic example is the horned grebe. This North American water bird breeds in early summer on the small ponds, lakes, marshes, and slow-moving streams of the northern reaches of the Northern Hemisphere. The birds are usually solitary, but often nest close together. On the wooded lakes and marshes where they breed, adults possess "horns"—smooth, golden ear tufts—and a ruddy, chestnut color on the sides and throat. In winter the grebe's richly colored feathers give way to subdued gray and white ones well suited to the Atlantic Ocean wintering grounds where seclusion is difficult and caution a necessity.

Members of the grouse and pheasant family are not generally known for seasonal color changes. These birds live close to the ground, and burst into short, swift flights when frightened. Since they are more vulnerable to predators than most birds, their feathers are mottled brown or gray, but even these low-profile birds dress up for mating: male ruffed grouse with fanned tail, sharp-tailed grouse with inflated purplish neck sacs. These retractable displays are unveiled for mating and concealed from potential enemies.

Other members of the grouse family are the ptarmigans—willow, rock, and white-tailed. These birds carry concealment strategy to the extreme. In winter their white plumage blends with the white, pure snow. As spring melts the arctic snow they molt into dark, mottled feathers that blend with the tundra's summer vegetation so they can remain cryptic. In spring or fall ptarmigans exhibit a transitional molt. These plumages do not constitute an elaborate wardrobe, but they do reflect nature's ingenuity and the need for living things to adjust to changing circumstances. □


DARRELL GULIN

The ptarmigans—white-tailed, willow, and rock—are small arctic grouse whose plumage changes from summer brown to winter white. In spring and fall the ptarmigans pass through motley transitional molts. This rock on the rocks, top right, is an example. Pictured above and lower right, willow ptarmigans.

STEVEN D. FACCIO

WOLFGANG KAEHLER

A GUIDE TO THE BIRDS OF COSTA RICA by F. Gary Stiles and Alexander F. Skutch. Illustrated by Dana Gardner. 1989. Cornell University Press, Ithaca, New York. 511 pages. $65.00 (cloth). $35.00 (paper).

The young Costa Rican tour guide holds the book reverently. With this book, he says in Spanish, I can know the birds. While he can't read the English text, he has memorized where each species appears in the plates.

We're at the La Selva Biological Station in Costa Rica gathering impressions on the new field guide to Costa Rican birds. Some of the best local birders are here as well as crack teams from the United States and Europe. Nobody can find anything critical to say about the new field guide. Most are here for the Christmas Bird Count, an event usually led by Gary Stiles, an author of the book. Many have been birding with Stiles and regard him the way a Little League hitter looks at Darryl Strawberry.

Stiles, formerly a professor at the University of Costa Rica, teamed up with Alexander F. Skutch, the venerated sage of tropical ornithology. A skilled and patient student of nature, Skutch has been recording his observations in books and articles for more than 50 years. Some of the birders here at La Selva can quote passages of Skutch's rich prose from memory.

Dana Gardner, an artist who has worked with Skutch before, painted every species, migrants and residents, in 52 colorplates. The pictures alone will make you start packing for Central America.

Costa Rica, half the size of Tennessee, has 830 species, more birds than all of North America. Bird watchers started the current tourism boom in this tiny peaceful nation, and most tour operators still cater to visitors with binoculars. But heretofore, birders in Costa Rica had to make do with field guides to neighboring countries.

Some of the plaudits raining in on *A Guide to the Birds of Costa Rica* are simply because of the overwhelming need for such a book. Every year, thousands of birders from all over the world invest their savings in a trip to Costa Rica. It's worth it. Costa Rica is alive with birds, from the beaches and mangrove swamps at sea level, to the cloud forests high astraddle the continental divide. But without a field guide it's impossible for the visitor to unravel and appreciate this country's complex avifauna.

Most of the praise for the new field guide, however, is well deserved. Stiles and Skutch labored for 17 years on this 511-page tome, and it shows. The book is authoritative, comprehensive, thoughtfully planned, and accurately illustrated. There is a generous amount of information about each species as well as chapters on geography, habitats, conservation, and birding hotspots.

Although many local common names are included in the index, one hopes that the entire book will soon be translated into Spanish so that the up-and-coming corps of Costa Rican guides can take advantage of this valuable field tool. The book is scarce and overpriced in Costa Rica; buy your copy before you go.

—*Chris Wille*

SOUTH AMERICAN BIRDS—A Photographic Aid to Identification by John S. Dunning. 1987. Harrowood Books, Newtown Square, Pennsylvania. Over 1,400 color photos. 351 pages. $35.00 (paper).

THE BIRDS OF SOUTH AMERICA, Volume 1, by Robert S. Ridgely and Guy Tudor. 1989. University of Texas Press, Austin. Colorplates, black-and-white range maps. 516 pages. $65.00 (cloth).

So you are a birder expanding your horizons, looking for a field guide to South American birds that will slip into the same little field bag you carry in Idaho and that will allow you to identify quickly all the cinclodes in Chile or the antbirds in Amazonia. Sorry. Such a guide doesn't exist. Too many species occur in South America—almost 3,000 by current count—maybe even more, since taxonomists have "lumped" many geographically isolated forms that further research may prove to be distinct species.

But don't be discouraged from venturing to this wonderland of fascinating bird shapes, sounds, and behavior. Recently two books on South American birds have been published that together will give you a good jump on identifying many of the birds you'll see on that continent.

The first book, *South American Birds*, by John S. Dunning, is perhaps the best we can ever hope for in a reasonably transportable field guide that covers the entire continent. It's close in size and weight to National Geographic's *Birds of North America*, yet it includes field marks and range maps for over 2,700 inland (non-oceanic) species and photographs for about 45 percent of them. The photographs are a sample of Dunning's monumental 25-year effort to document the appearance of South American birds, especially such aspects as eye color which are lost in museum specimens.

Readers who know Dunning's earlier work, *South American Land Birds* (Harrowood Books, 1982), will find this new volume more comprehensive, better organized, and richer in photographs. Some of the range maps are more accurate, and an introduction to South American birds has been added.

Still, Dunning's book does not permit easy identification of most South American birds. Too few portraits of species and plumage variations are included, the descriptions of field marks are too brief, and many range maps remain inadequate. Moreover the book omits information on the birds' natural history almost entirely. Without knowledge of each species' feeding behaviors, vocalizations, and habitat preferences (for example, the leaden antwren is found only on river islands), any birder will have a mighty frustrating time south of the border.

Robert Ridgely and Guy Tudor to the rescue! Their new book, *The Birds of South America,* Volume I, affords each species an accurate range map, range description, extensive identification marks, comparisons to similar species, and most important, a section on habitat and behavior. Tudor's plates are his best ever of South American birds. The postures and shapes represent a further improvement over his highly admired illustrations in *Birds of Colombia* and *Birds of Venezuela* (both from Princeton University Press).

As in Dunning's book, fewer than half of the species included are illustrated; however, species that are not pictured are close relatives of the birds that are shown making it easy to identify most of them. As an analogy, in North America, the blue jay and Steller's Jay are close relatives. After learning one of them, identifying the other is relatively easy even without an illustration. To help the reader make similar connections in South America, Ridgely and Tudor provide succinct descriptions of groups of closely related species (mostly genera). For example, you will learn here that the violaceous euphonia of Trinidad is a geographic replacement for the thick-billed euphonia of Colombia, and recognizing such geographic replacements will put you on a fast track to identifying many species as you travel from one South American country to another.

With all this information the Ridgely and Tudor book is not a field guide as we generally use the term. It is large (7x10 inches) and hefty (nearly 4 pounds). It's only one volume (covering jays to finches) of a four-volume set. And despite its bulk and wealth of information the book still does not include everything you need to know to identify all the bird groups that it covers. There's no way it could. The way around this problem would be to direct the reader to other information sources pertaining to each species. And the fact that the authors do not do this is the book's greatest failure.

Consider, for example, the *Turdus* thrushes (the "robins"). South America has 23 *Turdus* species, and identification by plumage is often tricky, as Ridgely and Tudor point out. Thrush songs and calls, however, allow an observer to identify the birds long before they are seen. Ridgely and Tudor provide written descriptions of vocalizations, but thrushes tend to sound rather alike on paper. Listening to recordings is the preferred means of learning, and fortunately a comprehensive cassette of thrush songs and calls is available, prepared by J. W. Hardy and T. A. Parker (ARA Records, P.O. Box 12347, Gainesville, Florida 32604). Yet this tape and materials like it are not cited. Perhaps this shortcoming can be overcome in later volumes.

So how do you learn the birds of South America? Build a library starting with these two books as the cornerstone. Then add guides for more specific geographic areas (such as the excellent *Birds of Colombia* by Steve Hilty and William Brown), a tape collection (such as the ARA tapes), and books on individual bird families (like our book, *The Tanagers*). You might then employ the adequate margins in Ridgely and Tudor's book to note these additional materials.

Only 20 years ago birders seeking to expand their horizons to South America were deterred by the paucity of illustrations and natural history information. In the past two decades this void has been gradually filled with a wealth of new materials to which *South American Birds* and *The Birds of South America* are landmark additions.

—*Morton and Phyllis Isler*

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LOOKING FOR MR. GOODBIRD

Pete Dunne

Of all the questions birders pose to birders, the one that stops me every time is most commonly phrased: "Have you seen any 'good' birds?" Now, I ask you, how do you go about fielding a loaded question like that? What puts the *good* in good bird?

Usually I find myself not answering right away. I just stand there impersonating a yellow-crowned night heron with tetanus. Part of me wants to reach out to the errant soul to offer an impromptu chickadee appreciation seminar. The other part wants to kick the kneecap on this snob birder who is trying to back me into a metaphysical corner.

"Just say no," prompts my sainted wife, Linda, out of the corner of her mouth. "Don't make a big deal out of it or play Ghandi or Rambo. Just say . . . "

No! I scream (in my mind). I haven't seen any "good" birds. Nothing but garbage, trash birds. Worthless chickadees and titmice. Scruffy song sparrows. Brrrrr.

How dare you and your fascist bird snobbery impugn my appreciation of titmice (I dream of shouting). Have I seen any good birds? Pah. I spit on your notion of good birds. I . . .

But this is just a fantasy. "Yes," I hear myself surrendering, hating my ethical paralysis. I say either, "a curlew sandpiper is feeding with stilt sandpipers over in the west pool," or "No, I haven't seen anything . . . good." Fact is I catch myself asking the same question whenever I meet other birders in the field, perpetuating this unjust system of avian segregation.

Why must good be synonymous with rare? Why does a bird have to be a thousand miles from where it belongs or heading for biological bankruptcy to be good?

Why can't the good in good bird relate to color and shape and design? That's what is good in good art. Has anyone ever admired a Van Gogh because it was perched in a gallery four thousand miles from Arles? No. It is admired because it's great art.

Why can't the good in good bird relate to a bird's poise or behavior? That's what is good about good acting. Nobody (except maybe Marlon Brando) has ever developed a reputation for good acting by turning up on a set about as often as Cox's sandpipers turn up in Massachusetts.

Why can't the good in good bird relate to a bird's skill or finesse? That's what is good in a golfer's putt, a second baseman's play.

I'm not the only one who has trouble meeting other people's expectations for a good bird. I saw famous bird-tour leader Victor Emanuel try to respond to the deadly demand in Cave Creek Canyon, Arizona, last summer.

Victor, a true Renaissance birder, held forth enthusiastically on Strickland's woodpeckers, elegant trogans, sulphur-bellied flycatchers, and a "wonderful" painted redstart. Finding these species in Cave Creek is the birding equivalent of going to Mount Rushmore and discovering the likenesses of Washington, Jefferson, Lincoln, and Roosevelt.

The woman who had posed the question to Victor regarded him as if he were offering her the Brooklyn Bridge. These weren't good birds (her expression said). These were everyday birds. She wanted to hear about good birds (American redstarts or eared trogans), which *are* good birds, I think, but no better than painted redstarts or elegant trogans.

What she wanted was to visit Mount Rushmore and find the Acropolis. If you want to see the Acropolis, try Greece. Here—I'll draw you a map. If you want to see an American redstart, try Massachusetts. Eared trogan? Try Mexico.

I know I'm being simplistic. I understand and appreciate the pleasure of watching birds that I rarely see either because they are uncommon or the species falls outside my normal range. But I'm nervous about endorsing a system of values that accents avian paucity. If uncommon is good and rare is better, what does that make extinct?

I'm not one to denigrate chickadees and titmice just because consistency is among their considerable charms. A chickadee is just a good bird that I see all the time.

So I think, therefore, that the next time some passing birders pose the deadly demand and want to know whether I've seen anything "good," I will reply: "Yes, all the usual good birds." And hope that they don't press me for details. ☐

STEVE CARVER

A chickadee is a good bird I see all the time.

Northern gannet by Tim Fitzharris

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